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AGRICULTURAL REVIEW

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The Philippine Agricultural Review

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EDITOR

G. E. NESOM, M.S., D.V.M., *Director of Agriculture*

ASSISTANT EDITORS

CHAS. M. CONNER, B.S.A., B.S.,
Assistant Director of Agriculture

E. A. CODDINGTON, B.S., A.B.,
Superintendent of Publications



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Directory of the Bureau of Agriculture.

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EDITORIAL.

During the past two years THE PHILIPPINE AGRICULTURAL REVIEW has been growing in favor with all classes in the Philippines so that with this number, which marks the beginning of its third year, the outlook is most encouraging and the field for the publication division of the Bureau is growing larger each year. There are far more actual readers of English and Spanish in the Islands to-day than ever before. The task of reaching that part of these readers which is interested in the farms of the Islands with the best agricultural information obtainable is the work of the REVIEW.

In accordance with established precedent the first number of each volume is devoted to the report of the Director of Agriculture for the last fiscal year; therefore this number is limited entirely to the report of the Director for the fiscal year 1908-9 as shown by the table of contents.

The growth of the Bureau during the past year has been marked and steady, and no radical changes have been made in the policy as outlined in the last annual report. The general appropriation of ₱525,000 by the Philippine Legislature for the fiscal year of 1909-10 as compared with the general appropriation for the preceding year of ₱350,000 shows a growing interest in the subject of agriculture; yet this appropriation is actually inadequate to satisfactorily carry on the work of the Bureau as outlined by the Secretary of the Interior and the Director of Agriculture.

The greatest effort made by the Bureau has been to get a sufficient number of veterinarians for the division of animal industry, and to make the work of this division as efficient as possible for the purpose of stamping out epizootic diseases

amongst the farm animals of the Islands. The provincial veterinary service has been placed under the supervision of two of the most experienced and efficient veterinarians as traveling inspectors, one of whom has charge of the work in the Visayas and the other on the Island of Luzon. The force of this division of the Bureau has been gradually increased so that at the close of the fiscal year there were 22 veterinarians. At this date, January 1, 1910, by special arrangement this number has been increased to 44 veterinarians, 12 American agricultural inspectors and inoculators, and 52 native live-stock inspectors and inoculators. The work of stamping out epizoötic animal diseases has not only received the closest care and attention of the Director of Agriculture but the active coöperation of the Secretary of the Interior and the Governor-General of the Islands, and it is believed that this division of the Bureau will soon have complete control of the spread of such diseases as rinderpest, surra, and foot-and-mouth disease, which have carried away so many of the farm animals in the Islands, without which it is impossible to carry on satisfactorily any agricultural work of importance.

In this connection it should be noted that the general quarantine depot including the live-stock quarantine station and the hospital for diseased animals at Iloilo has been completed. The general quarantine depot at Pandacan in Manila is well under way. The site at the Manila quarantine station will include not only sheds for the general quarantine of animals and hospital buildings for the care of sick animals, but the forage factory and the buildings for the College of Veterinary Science of the University of the Philippines.

Probably one of the most important problems in connection with the development of agriculture in these Islands is that of finding suitable draft animals for the use of Philippine farmers. For many purposes the carabao is too slow and too susceptible to disease, neither does it possess the requisite powers of endurance for a satisfactory draft animal on Philippine farms. In order to secure a better type of work animals the Bureau has imported some Indian cattle, to determine their suitability as draft animals for Philippine farmers. The results of experiments made with these cattle in Java, Brazil, and Jamaica give those concerned every hope that they will prove equally successful as draft animals in the Philippines.

Considerable work has been undertaken by the division of plant industry. A large number of varieties of rice have been sown and are being grown experimentally for the purpose of

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determining the best kinds as to the quantity and quality for growing on Philippine farms. A fiber expert was sent into the field to study varieties of abaca and secure such data as is of interest to hemp growers. Other fibers are also being studied. Under Act 1898, providing for crop-reporting statistics, the division of statistics of the Bureau hopes to get more accurate and satisfactory information regarding the actual conditions of agriculture in the Islands and to accomplish a great deal during the coming year.

REPORT OF THE BUREAU OF AGRICULTURE FOR THE FISCAL YEAR ENDING JUNE 30, 1909.

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BUREAU OF AGRICULTURE,

Manila, August 9, 1909.

SIR: I have the honor to submit herewith the annual report of the Bureau of Agriculture for the fiscal year ending June 30, 1909:

The organization of the Bureau of Agriculture remains unchanged, consisting, as before, of three divisions—administrative, plant industry, and animal industry.

ADMINISTRATIVE DIVISION.

The development of THE PHILIPPINE AGRICULTURAL REVIEW, which has become a periodical of marked importance, and the necessity of closer supervision of this and other publications necessitated creating the position of superintendent of publications. It has been found convenient to merge the position of

property clerk with that of cashier, and to provide for a shipping clerk whose duties are the performing of all work necessary in receiving and dispatching property used by this office and its employees in the field. The position of chief clerk has been re-created. In order to secure better supervision of the veterinary work, the Islands have been divided into two districts; the first including Luzon and the other islands as far south as the sub-province of Romblon, and the second comprising the Visayan Islands and the regularly organized provinces of Mindanao. Two veterinarians have been designated as district veterinarians and one assigned to each of these districts, to act in a supervisory capacity.

PUBLICATIONS.

"THE PHILIPPINE AGRICULTURAL REVIEW."

THE PHILIPPINE AGRICULTURAL REVIEW was first issued in January, 1908, to bring the farmers throughout the provinces more closely in touch with the work of this Bureau, and to furnish them with literature relating to tropical agriculture. This publication has been appreciated by the people and the number of contributors from the provinces is increasing. The increased amount of work has made it necessary to appoint a superintendent of publications; accordingly Mr. E. A. Coddington, formerly a division superintendent in the Bureau of Education, was transferred to this Bureau to take charge of the work.

Each January number of the REVIEW has been given over entirely to the annual report and the following table gives an analysis of the subjects treated in the remaining numbers:

Crops.	Number of arti- cles.	Number of pages.
Rice	8	26
Sugar	1	6
Tobacco	1	13
Hemp	3	11
Copra and coconuts	4	30
Rubber	7	57
Maguey	1	2
Cassava	1	21
Annatto	1	3
Peanut plant	1	17
Coffee	1	8
Cacao	4	46
Castor plant	1	5
Oranges	2	9
Silkworms	1	5

When the mailing list for the REVIEW was first prepared an effort was made to reach as many of the Filipino farmers as possible. Responsible people were asked to send in names of

those who could understand and profit by such a publication. The result was a very large list, particularly for the Spanish edition. As the REVIEW became better known and more widely distributed, requests continued to come in for copies, which resulted in a still larger list. It was thought that many of these copies were going to persons who had no particular interest in the publication but were receiving it simply because some friend had asked to have the REVIEW sent to them; therefore, printed cards were sent out to those in the provinces who were receiving the Spanish edition, asking them to fill these cards in and mail them to the Bureau if they desired their names continued on the mailing list. The result was a material decrease in the Spanish edition, which was reduced from 5,800 to 3,400 copies. At the close of the fiscal year, 1,661 English copies and 3,171 Spanish copies are being sent to the provinces of the Philippine Islands; 251 English and 209 Spanish copies are being delivered to the people in Manila; 724 English and 7 Spanish copies are being sent to the United States, and 320 English and 39 Spanish copies go to foreign countries. The total mailing list of the REVIEW now contains 6,382 names.

OTHER PUBLICATIONS.

As most of the data of interest to farmers in the Philippine Islands collected by workers in the Bureau of Agriculture are published from time to time in the REVIEW, there is very little left to be published in separate form. Only bulletins dealing with specific subjects, of a nature which makes them more technical than popular, are published in separate form. During the year General Order No. 13, dealing with quarantine regulations, was published under separate cover. Bulletin No. 7 of the regular series, entitled "The Garden," was published in March. This bulletin deals with the growing of foreign garden seeds which are thought to be adapted to the Philippine conditions. Another bulletin entitled "Cóconuts" has been written but has not been published on account of lack of funds.

LIBRARY.

All books kept in the library of this Bureau belong to the library of the Bureau of Science and are held on memorandum receipt. Only such books are kept as relate directly to the work of this Bureau.

Aside from the books mentioned above, there are a number of pamphlets and bulletins published by the United States Department of Agriculture, the State experiment stations, and various

foreign agricultural societies. Most of this material is unbound, except that when complete sets are secured the Bureau of Science binds them and loans them to this Bureau on memorandum receipt. Quite a number of periodicals are being sent to the Bureau in exchange for THE PHILIPPINE AGRICULTURAL REVIEW.

STEAM PLOWING AND MACHINERY INVESTIGATIONS.

All the large steam plows and engines used in the steam plowing work of this Bureau have been described in previous reports, hence it is not necessary to go into detail as to description in this report, except in case where new machinery has not been thoroughly tested out.

PLOWS.

The four and six-disk "Private" plows, manufactured at La Crosse, Wisconsin, were tested in light, sandy soils, also in black soils comparatively free from sod and rubbish, and were found to work perfectly; but in heavy sod land, particularly when comparatively dry, the plows are not heavy enough to stay in the ground. These plows could be used to advantage on all sugar estates where the soil is sandy and comparatively free from sod.

ENGINES.

The Hart-Parr petroleum-burning engine mentioned in our last report has been given a thorough trial during the past year. It has proven a very desirable engine to use in those sections where fuel and water are scarce. It develops all the power claimed for it and is as easily handled as a steam engine of like weight and power. The engine has some structural defects which have developed by usage. The oil-cooling tank is not made sufficiently strong nor sufficiently well-braced to withstand the jolts and jars resulting from running the engine over rough ground. The large differential wheel is not sufficiently heavy to withstand the strain when the plow strikes on a stump or heavy sod. The engine is well adapted to use on sod land where the resistance is uniform, but when used on new rough land there should be a greater margin left between the maximum horsepower of the engine and the average resistance of the plow. This is shown by the fact that none of the defects mentioned above develop when the engine is used on land that has been plowed the previous year. The jar resulting from the heavy explosion has caused the spark plugs to get out of adjustment, but this is another structural defect which can be easily remedied.

SMALL PLOWS.

Small plows which have been purchased and sent by the Bureau to various farmers for the purpose of testing them in order to ascertain which make of plow would do the best work in soils may be classed according to merit as follows: Black land plow, manufactured by B. F. Avery & Co., Louisville, Kentucky; the John Deere Shetland pony plow, and the Oliver chilled rice plow, No. 1. One bullock can pull any of these plows easily and they do very excellent work in all soils except those covered with heavy sod.

The 10-inch "Prairie Queen" plow has given good results in a test at Alabang. With four bullocks ordinary cogon sod can be turned 6 inches with comparative ease, if the ground is moist. The method usually followed, however, is to first plow 4 inches deep then harrow the ground and cross plow 6 inches deep, which destroys practically all of the cogon and puts the ground into good shape for growing crops.

MAGUEY MACHINE.

The Prieto single wheel fiber-cleaning machine, as mentioned in our last report, has not been given a thorough test owing to the fact that the construction of the machine was faulty. That is, the shoe was not true, hence the knife touched the shoe in the middle but not at the sides. Owing to the construction of the machine it was impossible to remedy this without ordering a new shoe.

The Pioneer maguey machine has been sent to Cebu and mounted on a flat car for the purpose of demonstrating machine stripping along the line of the Philippine Railway Company. This company has been very active during the past few years in interesting the farmers along its lines in maguey planting, and a part of the maguey planted is now old enough to commence stripping. Circulars giving instructions as to the growing of maguey have been translated into the language of the province and distributed throughout this maguey-growing section. The Philippine Railway Company coöperated in the machine experiments by furnishing all transportation, fuel for operating the engine, and the labor. The people have become much interested in this work and it is expected that a larger and more up-to-date machine will be purchased and used for demonstration work during the coming year.

FORAGE FACTORY.

Machinery for the manufacture of forage from native products such as corn, beans, palay, and native fodders has been installed in a building erected at the stock yards near Pandacan. It is designed to take these native products and, after thoroughly drying and grinding, to so mix them as to make a balanced ration for horses, cattle, etc. This work, of course, is largely experimental but we hope to have the plant in full operation early in the coming year.

AGRICULTURAL EXTENSION WORK.

Señor Pablo Tecson, superintendent of agricultural extension work, visited eight provinces during the year, in the interest of agriculture.

CROP PESTS.

During the early part of the year a number of reports of damage done to crops by rats were received. Most of the parties making these reports requested information as to the best method of poisoning the rats. In order to obtain definite information as to the extent of the damage done and to ascertain whether or not rats were actually causing all the damage reported, Mr. David B. Mackie, an assistant agricultural inspector, was detailed on this work.

CROP REPORTING AND STATISTICS.

The system of crop and live-stock reporting and of statistical work adopted by this Bureau, as fully explained in the last two annual reports of the Director, has been in full operation about two years. The work has increased rapidly, as is shown by the following:

Fiscal year.	Monthly reports received from correspondents.	Number correspondents at end of year.
1907	1,628	370
1908	3,500	561
1909	7,155	696

For the first half of the fiscal year under review, Mr. T. R. Flack was statistician, having been followed January 1, 1909, by Mr. S. S. Sandejas as acting statistician, who was followed

on February 19, 1909, by Mr. W. D. Hobart, acting statistician at the present time.

No change has been made in the method of tabulating crop reports up to the present time. The monthly reports received from correspondents have been compiled by provinces, in which form they are published every month in THE PHILIPPINE AGRICULTURAL REVIEW, and segregated under subjects as well, so that all the information received regarding any kind of animal or the status of any crop is available under its respective head.

TOBACCO BOUNTIES.

During the year the Bureau furnished a representative to assist in awarding tobacco bounties, as provided under Act No. 1767. The committee in its report recommended certain changes in the law in order to distribute the bounties among a greater number of growers and to remove any possibility of unfair competition. The main features of these recommendations were framed into a law and passed by the Legislature late in the fiscal year.

DIVISION OF PLANT INDUSTRY.

This division includes all general plant investigations, seed distribution, laboratory and field tests of seeds, and work at the experiment stations. Experimental work is carried on at the following places: Singalong experiment station, located in the southern part of Manila on sandy soil, at sea level; Baguio experiment station, located at Baguio, subprovince of Benguet, at an elevation of 1,500 meters; Lamao experiment station, located at Lamao, Bataan Province, at sea level; and La Granja Modelo, located on an old Spanish model farm near La Carlota, Occidental Negros. The latter station is devoted largely to experiments in sugar cane, maguey, abaca, and rubber. A number of mares have been sent there during the past year with the idea of converting a part of it into a stock farm.

PLANT INVESTIGATION.

ABACA.

In the absence of a fiber expert, very little new work has been undertaken with abaca during the past year. The plants grown from seed at Singalong experiment station have been distributed; the plants grown at La Granja modelo are still under observation and will be used to enlarge the fields already started at this

farm. A man has been secured to undertake further investigations in the fiber industry, who will take up his duties at the beginning of the next fiscal year. A number of requests for abaca seed have been received but great difficulty has been experienced in securing it. Several parties promised to supply large quantities, but they have failed to do so.

MAGUEY.

The Bureau has continued to distribute large quantities of maguey to all parts of the Islands, particularly to Oriental Negros which seems to be especially well adapted to the growing of this plant. One million pole plants have been ordered from Hawaii to supply the demand in this section. The plantings of both the Hawaiian and the native maguey at Lamao and Occidental Negros have about reached the stage where experimental tests can be made with machine strippers. Owing to the fact that this plant is adapted to comparatively dry land, it is rather difficult to secure the fiber by retting, hence, if maguey-growing in the Philippines is to be developed very extensively, machine strippers will have to be put within reach of the small growers. As mentioned under the head of "Machinery Investigation," some work has already been done along this line with very favorable results.

KAPOK.

Very few calls have been received for kapok seedlings during the year. A large part of the seedlings growing at Lamao have been destroyed because they became too large for any use. Plantings have been made at Lamao and Alabang in order to make a commercial test; namely, to ascertain the yield per hectare where plants are grown in a field devoted exclusively to kapok. We have continued to collect data on the yield of kapok trees as found growing in the Islands. Most of these trees are sadly neglected from a commercial standpoint, as they are found growing either wild or in fence rows and, of course, the yield is comparatively small. Manufacturers in the United States and foreign countries are beginning to appreciate more and more the value of kapok and its use is being gradually extended, which insures a steady market for this product at a fair price.

RUBBER.

The three species of rubber growing at Singalong experiment station, namely, *Hevea brasiliensis*, *Castilloa elastica*, and *Manihot glaziovii*, have continued to make satisfactory progress in

growth, as indicated by these measurements of their circumferences taken 1 meter from the ground:

	Circumference of—				
	<i>Hevea brasiliensis.</i>		<i>Castilloa elasticá.</i>		<i>Manihot glaziovii</i>
	1908	1909	1908	1909	1909.
Tree No. 1	20.63	27.50	31.25	40.00	39.00
Tree No. 2	23.75	35.00	30.00	—	46.00
Tree No. 3	22.50	33.13	37.50	42.50	51.00
Tree No. 4	26.25	35.63	27.50	36.88	—
Average	23.28	32.81	31.56	39.79	45.38

The plantation of Ceara rubber at La Granja modelo has been extended so as to have a sufficient number of trees to make a commercial test of the tapping. The trees growing at Singalong experiment station and those at La Granja modelo are now large enough for experimental tappings.

COFFEE.

The Maragogipe coffee growing at Singalong experiment station has been comparatively free from rust and blight during the year. This coffee originated in the Kongo district and it is claimed that it is not subject to rust. Fifteen trees gave a yield of 16 kilos during the season. The berries are of medium size and fairly uniform in shape. No tests have been made as yet of the quality of the coffee, owing to the fact that all the berries collected have been used in filling seed requests. A part of these trees now stand about $2\frac{1}{2}$ meters high. Three of the trees are so situated as to be shaded by rubber trees. While no figures have been kept to determine the difference in yield where the trees have been shaded, yet it is very noticeable that the trees in the shade are both more vigorous and more heavily fruited.

A small plantation of Liberian coffee is being set out at Lاماó experiment station. The young trees were started in pots and then planted 5 meters apart each way. They are now about $1\frac{1}{2}$ meters high and well loaded with berries. The trees have no shade and are given clean cultivation. No fruit has been harvested up to this time.

Some seeds from an Arabian coffee tree ten years old and free from blight were sent in by Mr. Currans, of the Forestry Bureau, from the Mountain Province. These were planted to see if plants could not be grown fairly resistant to the blight which is killing so many of the Arabian coffee trees in the Islands.

CITRUS FRUITS.

The orange trees growing at Singalong experiment station have borne irregularly during the year. Some of the trees that were full of fruit last year contain very little or no fruit this year. The Japanese oranges bear well, however, but the fruit is not marketable, being very sour and having no flavor.

The tangerine trees bore well last year, but this year only a few undersized, irregular-shaped oranges have set on the trees.

The lemon and grape fruit trees at Lamao station have made excellent growth during the year and have been exceptionally free from insect pests and diseases. One of the trees has set fruit.

Insect pests have done comparatively little damage to citrus trees during the past year.

AVOCADO PEARS.

The avocado pears growing at Singalong experiment station have so far failed to set fruit. In view of this fact it was thought best to secure some more seed and start a larger plantation. Accordingly a number of avocado pears were ordered from Hawaii and brought over in cold storage. As a result of this some thirty young trees were secured and transplanted at Lamao experiment station. These trees are growing nicely and it is hoped that some will be secured from this lot which will bear fruit.

BANANAS.

About seventy of each of the following varieties of bananas are being grown at Lamao experiment station, namely, *Sabá*, Chinese Dwarf, *Latundan*, *Bungulan*, *Gloria*, *Lacatan*, and *Matabia*. These have made good growth during the year owing to the fact that the dry season was comparatively short. A record is kept of the yield, shape, quality, etc., so that data will soon be forthcoming on these subjects. The Chinese Dwarf and *Latundan* have proved so far very heavy yielders and of extremely fine quality. A fungus has bothered them to some extent but this may not prove very serious. The Chinese Dwarf being comparatively low to the ground does not suffer so much from the winds as do the taller-growing varieties.

CORN.

All varieties of corn grown by the Bureau have been discarded except the large Mexican June corn, the first planting of which was made at Singalong experiment station in May, 1908. This first planting consisted of four rows about 100 meters long. Two of these rows were planted on level ground about one

meter apart; the other two on ridges about 20 centimeters high and 1.5 meters apart. This corn promised well nearly up to the time of maturity, standing some 2 meters high before tasseling. Most of the stalks seemed strong and vigorous but the yield was comparatively small, being only 400 kilos per hectare. This was probably due to several causes. First, the seed was not acclimated; second, the period of growth was almost entirely within the rainy season; third, the ground was comparatively flat and not sufficiently well drained for growing corn during the wet season. The crop was gathered from August 10 to 24, a few days over three months from planting time.

On October 26, 1908, seed from the above crop was planted on unplowed ground among some peanuts. On account of the presence of the peanuts all cultivation was done with hoes. The corn began to tassel the first week in December at about 1 meter in height, at which time the prospects for a crop even equal to the former were extremely poor. The earliest maturing stalks were detasseled to prevent self-fertilization. At about this time a fertilizer in the form of rotten cotton-seed was applied at the rate of about 2,000 kilos per hectare. From this time on the weather conditions were also more favorable and the corn soon reached a height of from 2 to 2½ meters. It eared fairly well, a large percentage of the stalks bearing two ears. The crop was gathered as it ripened, the first being picked February 1. The yield approximated 1,190 kilos per hectare and some of the best ears tested 73.4 per cent grain. There was considerable rain during the entire growing season, in fact there was really more rain than during the time the former crop was grown.

Another and a larger plat of this variety was planted on February 6, but owing to the seed being partially destroyed by ants the stand was comparatively poor and was replanted on February 27. The ground on which this crop was planted had been rather heavily dressed with stable manure some time previous. The planting was done in the usual way, namely, in rows about 1 meter apart and one-half meter in the rows. It was given sufficient cultivation to keep the ground thoroughly pulverized and free from weeds. There was one irrigation necessary during the driest part of the season. This corn began tasseling at about 1½ meters in height, the first appearing March 26; the silks appeared a week later. The first ripe corn was gathered May 21, about three and one-half months from time of planting. Owing to the fact that there was considerable replanting the last of this corn was not gathered until June 8.

Although nearly one-half of the planting had been replanted, the replant was not so good as the original planting, being slightly taller but not quite so heavily eared as the latter. The ears obtained from this planting were rather large, uniform in shape and size, being quite a decided improvement over the first crop. The yield was much better than the average crop of corn in the United States, being approximately 4,900 kilos per hectare, or about 60 bushels per acre.

The fourth planting of this corn was made on June 23, in order to ascertain if the small yield obtained during the rainy season was due to the fact that the corn was not acclimated, or whether or not the rainy season has a tendency to dwarf the plants. This corn has been distributed widely among the other farms and to private parties throughout the provinces. One party has been growing and selling it as green corn on the Manila market for ₱1 per dozen ears. We hope to have a sufficient quantity of this seed to distribute to all who may desire a start of it at the end of the next rainy season.

GUINEA GRASS.

Guinea grass has passed the experimental stage. A large number of those interested in the supply of green fodder for horses or cattle have recognized the value of this grass and calls for the roots have exceeded the supply. The Quartermaster's Department of the Army has recognized its value and promised to encourage the growing of it. Almost the entire area of land at Singalong experiment station has been devoted to the growing of this grass during the past year, for the purpose not only of furnishing roots to those desiring a start in the grass but to furnish *zacate* (fresh cut grass) to animals belonging to the Bureau in the city of Manila and at the Alabang stock farm. The results obtained in growing guinea grass at Singalong experiment station during the past year would seem to indicate that it may be grown throughout the dry season without irrigation. One plat of ground which had not been watered during the dry season, but had been frequently cultivated so as to keep the ground in good tilth, gave a yield of 50 tons per hectare at one cutting.

At the Baguio experiment station guinea grass has had a phenomenal growth, reaching a height of two meters and making very excellent feed. If there were a sufficient amount of ground at the Baguio experiment station for the cultivation of this grass the entire amount of grass and hay required for the stock farm could be furnished, thus saving the Bureau several thousand pesos each year now expended in purchasing forage.

PANICUM MOLE.

This grass is quite popular in the West Indies as a grazing grass and is adapted to soils that are frequently overflowed. Several packages of seed were secured through the courtesy of the Government stock farm at Ceylon and shown in boxes at both the Singalong and the Baguio experiment stations. A few plants were obtained at each place from the seed and have been transplanted into the open ground. It can be transplanted in a manner very similar to guinea grass, with the exception that this grass throws out roots at the joints which enables one to propagate it much more rapidly by cutting the stems into short lengths and planting them in the same manner in which the roots are transplanted. By some this grass is considered superior to guinea grass. It will take at least one season to determine its value under Philippine conditions.

SEED DISTRIBUTION.

Considerable difficulty has been experienced in the distribution of seeds this year, owing to the fact that there was some trouble in filling the order in the United States and it had to be canceled and the seeds reordered from Australia. For this reason the seeds which should have been distributed in November did not arrive until March. Hereafter, seeds will be ordered from Australia in order to prevent a recurrence of such a delay.

Only such seeds and plants have been distributed as were thought adapted to this country. Many of the vegetables adapted to a temperate climate do not do well in this climate at sea level but when placed in the higher altitudes, such as may be found in the Trinidad Valley, they do practically as well as in a temperate climate. Tomatoes, beans, peas, sweet corn, radishes, turnips, etc., were grown at Baguio experiment station during the past season with excellent results. The quality and size of the tomatoes were equal to those produced anywhere.

We have distributed during the year, 3,500 collections of vegetable seeds; 547 collections of flower seeds; 1,036,270 maguey plants; 9,703 mulberry cuttings and several carloads of guinea grass roots. The Maguey plants have been distributed principally in Negros and Luzon and the other seeds have been distributed practically over the entire group of Islands.

EXPERIMENT STATIONS.

Owing to the pressure of work in the veterinary division, sufficient funds have not been available to enlarge on the work already undertaken at the various experiment stations. Considerable work has been done along the line of systematizing

record keeping, etc., at these stations so that at any time a new man would be able to take up the work and carry it on as originally designed. As mentioned in our last report, the changes of men in charge of these stations are very frequent. For example, during the past year every farm under the management of this Bureau has changed hands except two, and one of these started with a new superintendent at the beginning of the year. This has been the case for a number of years and makes it very difficult to keep the experimental work at the various stations under full headway. Much of the progress of the work depends upon the individual in charge.

SINGALON EXPERIMENT STATION.

The work at Singalong experiment station was in charge of Mr. J. B. Thompson from the beginning of the fiscal year up to September 1, 1908, at which time he was transferred to the Alabang stock farm and Mr. H. A. Ireland, agricultural inspector, was placed in charge of the work.

The silk work at Singalong experiment station was under the charge of Mr. José Dizon, farm foreman, who has been looking after this work ever since it was started at Singalong. All of the silk grown during the past year has been reeled and woven into cloth at the experiment station. At the close of the fiscal year the silk work was discontinued at Singalong experiment station and all materials transferred to the Bureau of Science.

In view of the fact that the Bureau expects to abandon this station as soon as a suitable place is found for the property now located there, no new work was undertaken. All valuable plants have been removed to other stations and almost the entire area planted to guinea grass, for the purpose of supplying roots to those who wish them.

Labor conditions at this station remained practically the same as during the past year. About twenty-one laborers have been employed at different times, at an average daily wage of 89 centavos. This average daily rate varied slightly, depending upon whether or not a number of temporary men were being employed.

The equipment of this station has been reduced to the minimum by transferring all the machinery, etc., not needed, to either the forage factory or other stations. Practically all the live stock kept at this station is used for carromata purposes. Animals are sent there, however, from time to time, to await transportation to other places.

BAGUIO EXPERIMENT STATION.

This station has been in charge of Mr. M. C. Merrill throughout the year.

Most of the laborers at this station are Igorots. Igorot women are used when a sufficient number of men to carry on the work can not be obtained, but their services have not proven satisfactory. One of the greatest difficulties with the labor at this station is the fact that the Igorots do not work steadily, especially those who are paid by the day. They come and work for a few days, or possibly for a few weeks, and by the time they are broken in and beginning to be of some value they disappear and others are taken on. As a result, 133 different names have been on the pay roll during the year while the average daily number of laborers has been but 11.6. This disadvantage to the farm is a distinct advantage in one way, in that the Igorots by working a short time at the station absorb some modern ideas, some of which they will undoubtedly put into practice on their own farms. Thus there will be a gradual uplift among the Igorot farmers, who take naturally to agricultural pursuits. The average daily wage at this place is 54.6 centavos, exclusive of the native *capataz*.

Three heavy typhoons occurred during the month of October which did considerable damage to the station by washing out several plats of strawberries that had just been set out and blowing down the old stable, some coffee trees and other plants, as well as doing damage to small bridges, etc.

By opening up the irrigation ditch and providing a temporary dam in the Balili River a sufficient supply of water was made available for all purposes.

In the absence of well-rotted stable manure which makes, perhaps, the best fertilizer for vegetables, commercial fertilizers have been used to a great extent; but the high price of the chemicals used in making these fertilizers makes their use almost prohibitive except where the vegetables can be sold at high prices.

Insects and plant diseases have given comparatively little or no trouble, although they have appeared in a number of cases; but the damage done was no more than one would expect in growing vegetables in any other climate.

Although handicapped by late arrival of seeds for planting, the results obtained in growing all kinds of vegetables at this station during the past year have been far above expectations. A sufficient quantity has been grown to supply all of the demands of the Baguio market and some of the surplus has been shipped to Manila.

Almost every kind of vegetable has been grown at this station during the past year. Careful data have been kept of all crops grown so that we shall be able to tell not only the yield of vegetables per hectare but the cost of producing the same at the price paid for labor at this place. As all of the data relating to vegetables will be published in separate form, further data relating to them will not be given here.

LAMAO EXPERIMENT STATION.

Work at this station has suffered considerably during the past year on account of the changes in superintendents. Mr. H. E. Stevens who had been in charge of the station for nearly a year previous left the station in September, 1908, leaving the work in charge of a *capataz* until March 3, 1909, when Mr. O. B. Burrell, agricultural inspector, was placed in charge of the station.

Labor conditions at this station remained practically the same as in previous years with the exception that at times the laborers have been scarce owing to the fact that there is a large sawmill in the immediate neighborhood which pays higher wages than the Bureau and sometimes takes away some of our best laborers. The average daily wage is about 75 centavos, not including the wages of the *capataz*.

The fact that this station is located away from any town keeps the laborers fairly well satisfied and there are comparatively few changes during the year except in the rush season when extra labor is taken on.

Owing to the proximity of Mariveles Mountain little damage was done by the typhoon which damaged other stations, as mentioned above.

This station could be made practically independent of rainfall by utilizing the water from the river which rises high up on the mountain and passes through the farm; but in order to put in an effective irrigation system it will be necessary to do considerable piping as the soil in the valley is very porous and open; so that even though a large stream of water were taken out a mile up the river very little would reach the station.

No very serious damage has been done to crops by insects or plant diseases; the most disturbing element that we have to deal with at this station is the wild hogs. They seem to be plentiful on the mountain sides and as soon as anything like corn, potatoes, or cassava is planted they break through the fences and do considerable damage to the crops. The fencing around this station is made mostly of bamboo and does not turn them very well. A heavy woven wire fence around the farm will be necessary to prevent damage from these animals.

The work at this station is confined mostly to the growing of tropical fruits and vegetables. The temperature is a little too high to grow foreign garden vegetables. It is expected that in the future all work with citrus fruits and native vegetables will be carried on at this station, unless a substation should be established in the orange district for work with oranges. There are a number of native vegetables growing in the Philippines which if properly selected and cultivated would be far superior for distribution among the farmers to the foreign vegetables now being introduced. For this reason it is thought wise to devote a part at least of the funds allotted to the station to the growing and selecting of native vegetables, with the idea of improving those which are already here rather than trying to acclimate vegetables from the temperate zone.

LA GRANJA MODELO.

The work at La Granja modelo was in charge of Mr. H. J. Gallagher from the first of the fiscal year until November 8, 1908, when he was transferred to the Alabang stock farm and Mr. F. E. Deason placed in charge at La Granja modelo.

The labor conditions at this station have continued good throughout the year except during the milling season when there is a scarcity of laborers and a high price must be paid for temporary men. The average wages paid is 75 centavos per day, excluding the *capataz*.

As this farm was an old sugar *hacienda*, the equipment of it consists largely of sugar machinery of the old type. If any modern work is to be done with sugar it would be necessary to put in new sugar machinery.

Where to obtain water for irrigating this farm continues to be somewhat of a problem. As mentioned in the last annual report, the river which borders it on one side is not available because the mills further downstream require its water to furnish power for grinding during the milling season, when water is most needed for irrigation. There is another river running through the property but on the opposite side of the farm which, it is thought, can be diverted so as to furnish more irrigation water. Were it not for the fact that the soil is porous and open, a reservoir could easily be constructed in which a supply of water could be stored for use during the dry season; but efforts along this line have so far failed for the reason mentioned above. There are about 80 hectares of land at this farm that could be irrigated.

The soil is well adapted to growing forage, especially guinea grass, and an effort is now being made to see if live stock, such

as horses and carabaos, can not be maintained at this farm at a much lower cost than at other farms now operated by the Bureau. An attempt was made some years ago along this same line but the horses were destroyed by glanders and other contagious diseases, so that the effort was abandoned for a while. The vicinity of La Granja modelo is comparatively free from such communicable diseases at this time, and it is thought that by keeping a veterinarian in the neighborhood the animals can be kept in fairly good health.

We have placed five of the Nellore cattle recently imported from India at this farm for the purpose of testing out their value at sea level. A full description of these cattle and their use will be found in another part of this report. The only feature that is worth mentioning here is that these animals are very quick in action and it is thought that they will prove quite valuable as driving animals in Negros. The cost of maintaining them at this farm should be very small because of the fact, as mentioned before, that guinea grass and other crops thrive very well there.

Heretofore the crops grown at this farm have consisted largely of sugar cane and corn. Six varieties of cane namely, native cane, Louisiana stripped, rose bamboo, Tiboo merdith, Demarara, and white bamboo have been tested at the station during the year, and recently plats of 1 hectare in extent were planted with the idea of growing some for free distribution. The Hawaiian maguey set out at this station in the fall of 1907 is now about large enough to begin harvesting. Another field of 2 hectares has been planted and is doing well. The field of Ceara rubber, mentioned in the last report, was damaged to some extent by the typhoons of last October.

AGRICULTURAL EXPLORATION.

Several different men have been engaged in this work during the year. Near the beginning of the fiscal year a party was put into the field to inspect the coconut groves and eradicate the bud rot. They also collected data relating to the extent of this industry and methods followed.

Later, the party inspected the orange section and collected data as to the condition of the industry with the purpose of devising some plans for improvement.

During the rice harvest several men were in the field collecting data on varieties of rice and the rice industry in general. Samples were collected of as many different varieties of rice as could be found.

DIVISION OF ANIMAL INDUSTRY.

This division includes the control of animal diseases as carried on by the veterinary force, the production of serum, the breeding of animals at the stock farms, and all other general investigations in animal industry.

CONTROL WORK.

Considering the funds available and the difficulties under which the men have had to work in the provinces, considerable progress has been made in the control of contagious diseases in these Islands.

At the beginning of the fiscal year 14 veterinarians were on duty. This number was increased to 22 before the close of the year. However, only 14 of these were available for duty in the provinces, as 1 was in charge of the Trinidad stock farm, 1 in charge of the serum laboratory, 4 stationed at the ports of entry (Manila, Iloilo, and Cebu), and 1 was loaned to the Bureau of Prisons. Provision was made in the annual appropriation bill for a large increase in the number of veterinarians and it is hoped that before long there will be a sufficient number on duty to place one in each province with the necessary help to handle the situation, without shifting men from one province to another before they can really be spared from the work they are doing.

Provincial officials are now taking more interest in this work than formerly, and giving more aid in the way of maintaining quarantine and enforcing other regulations pertaining to the control of contagious diseases.

RINDERPEST.

Only two serious outbreaks of rinderpest have occurred in the provinces during the year; one of these was in the Cagayan Valley and the other in the Island of Siquijor. Neither of these localities had suffered from rinderpest for some time and the animals were very susceptible to the disease. The people did not appreciate the seriousness of the situation, and this made it very difficult to enforce the quarantine.

The method followed in treating rinderpest was to have corrals constructed in the infected barrios and all cattle found suffering from the disease were placed in the corrals under guard. When possible, the former corrals of all infected animals were thoroughly disinfected. All dead animals were buried or burned. An attempt was made to quarantine the infected barrios from those which were not infected, and the infected municipality from the adjacent ones. If sufficient serum was available

all exposed cattle and carabaos were inoculated. Whenever possible all carabaos in the infected barrios were examined daily by the veterinarians or inspectors and those found with the disease were removed to the corrals. An attempt was made to have the people keep their animals separate and not allow them to herd together, but this was found to be very difficult.

In carrying out this work as above outlined, it has been found to be advantageous to use as many native inoculators as the funds at our disposal will permit. This has several advantages: First, if an inoculator is properly trained in this work before being put into the field he is able to do the mechanical work, such as actually inoculating the animals, etc., which allows the veterinarian time to inspect outlying barrios and arrange for quarantine; second, the inoculator, is able to speak the language and get along with the people, whereas an American has considerable difficulty in making himself understood; third, in those sections of the provinces which are rarely visited by Americans a carabao requires very secure tying in order that the American may get at it and inoculate it, while a native may succeed in inoculating the animal without even tying it up.

After these men become thoroughly acquainted with the work necessary to be done, they can be left in charge of an infected area while the veterinarian goes to some other point. Heretofore, if the veterinarian had no help of this kind, he was forced to inoculate such infected animals as he could get together and then pass on to the next point. Frequently he never knew how many animals died after inoculation, nor did he know what effect his inoculations really had on the spread of the disease, except in cases where he could collect information from parties whom he knew were fairly reliable. One veterinarian and four or five trained inoculators can accomplish more than two veterinarians, and at less cost.

During the year 22,285 carabaos and 6,469 cattle were inoculated with anti-rinderpest serum; 3,322 carabaos and 312 cattle were reinoculated. Our reports show that 639 carabaos and 153 cattle died after inoculation.

SURRA.

Surra is undoubtedly second in importance to rinderpest and has apparently been more prevalent this year than last. Reports of the disease have come in from eighteen provinces. The only serious outbreaks have been on the Islands of Marinduque and Bohol, where it has done considerable damage. A total of 779 animals were found infected; 329 infected animals were killed by employees of the Bureau, and 166 other deaths were reported.

For the first time in several years this disease appeared in Manila, during April, 1909. Fortunately, however, it was soon eradicated and did comparatively little damage.

In dealing with this disease the blood of all susceptible animals in the infected district is examined. Horses found affected are killed, if possible, as the disease is always fatal to them. In most provinces the owner's consent must be secured before the animal can be destroyed, and in many cases this consent is denied. The only thing to do in such a case is to place the animal in quarantine or in an isolated spot until it eventually dies. It sometimes happens, however, that as soon as the officer is out of a district the animal is liberated and spreads the disease. Cattle and carabaos infected with this disease frequently carry it for a considerable time before showing outward symptoms and many after having it for a time recover; during this time, however, they serve as a means of spreading the disease. There should be some provision made whereby all animals suffering from surra could be destroyed at once and thus remove all possibility of their spreading the infection.

OTHER DISEASES.

Glanders has been found in eighteen provinces but there has been no serious outbreak and the damage resulting from it has been comparatively light. This disease affects only the equine species and occasionally human beings. Some 312 horses and mules were found suffering from glanders, 48 of which were killed by employees of this Bureau.

Foot-and-mouth disease has given considerable trouble in various sections of the Islands. It has appeared in some twenty-three provinces but since the quarantine service at ports of entry has been improved by putting in force General Order No. 13 the disease has steadily decreased until at the present time the provinces are comparatively clean. In combating this disease quarantines were established and instructions relating to the care of animals suffering from it were printed in Spanish and the native dialects and distributed among the people. Creolin and carbolic acid were sent direct, also through the provincial governors, to the people having affected animals. The medicine so distributed was greatly appreciated and most of it well used. Some 10,673 animals were found infected, and 125 deaths reported.

One hundred cases of ulcerative lymphangitis and 9 deaths were reported from ten provinces. The cases found were isolated and the owners instructed regarding the curative measures necessary to be taken.

Thirty-seven sporadic cases of hemorrhagic septicemia have been reported from five different provinces. By isolating the sick, disinfecting the infected areas, and burning the dead, the disease has been prevented from becoming epizoötic.

Only 67 cases of hog cholera have been reported from four provinces, but the disease has been more general than these figures indicate. Because of the prevailing custom of allowing swine to roam unrestricted and the absence of facilities for confining them, this disease will be a difficult one to control in this country. The numerous wild hogs to be found in nearly all parts of the country are often responsible for spreading this as well as other diseases.

A most beneficial factor in the control of animal diseases has been the operation of the new quarantine regulations. At the beginning of the year, the Bureau was operating under General Order No. 10 which permitted the landing of infected animals from foreign ports until three successive infected shipments had been landed from a given port, after which landing permits for all cattle and carabaos from such port were to be refused. No great good came of the enforcement of this rule since by shifting ports dealers were able to land some 2,325 diseased cattle and carabaos from the infected area before a single port was closed by the operation of this rule. About this time General Order No. 12 was issued, under which landing permits for infected shipments were to be refused, except for immediate slaughter. General Order No. 12, together with some revised rules and regulations relating to quarantine work, was reissued February 1, 1909, as General Order No. 13. The enforcement of this last general order resulted in our being able largely to prevent the spread of infectious communicable diseases from ports of entry. While conditions have improved, particularly at ports of entry, infection will continue to come in from time to time so long as shipments from infected ports are allowed to land, although upon the date of inspection they are apparently free from infection. Some very interesting data have been collected upon this subject. It has been found, for example, that prior to November 2, 1908, 10,254 cattle and 1,424 carabaos were landed in Manila free from disease, and that 2,216 cattle and 109 carabaos were found diseased, but landed. Of this number only 2,270 were embarked at the port of Hongkong. During the same period, 1,172 cattle were landed in apparently good condition, but were considered to have been infected before landing because they developed disease soon after. This entire lot was embarked at the port of Hongkong. During the same

period, 11,073 cattle and 79 carabaos were found infected and refused landing permits except for immediate slaughter, with the exception of the carabaos which, in this case, were held on lighters until it was ascertained that they were free from disease. Of this number all but 803 were embarked at the port of Hong-kong. These figures would seem to point to the source of infection.

QUARANTINE STATIONS.

Upon removal of the serum herd from San Lazaro the stables and houses were retained to be used as an immunizing station for cattle and carabaos. During the year such animals as it was found necessary to quarantine in Manila for rinderpest have been taken to San Lazaro. The number of animals belonging to private parties brought to this station for immunization was not so large as had been expected. This has been due in great part to the scarcity of desirable work animals coming to this market and to the fact that the buyers of those arriving needed the animals immediately and could not wait to have them immunized. As mentioned in our last report, the stalls, etc., at San Lazaro were in very poor condition, but provision has been made in the current appropriation for replacing the old wooden floors with concrete and providing proper drainage, so that in the near future we shall be in a position to properly care for all animals taken to that place.

The new stock yards and quarantine station at Pandacan will not be finished and ready for use before the middle of the coming fiscal year. The ground has been filled in with sand to a level of 12 meters. A contract for twelve cattle sheds to be constructed of concrete with tile roof has been let and they will be finished soon. Each shed will have a capacity of one hundred head. It is expected that the number of sheds will be doubled in the near future.

The quarantine station at Iloilo was completed shortly before the close of the fiscal year. This station is sufficiently large to take care of all animals expected to arrive in Iloilo for the next few years. The only objection that can be raised to the station is the fact that it is located too far from the point of disembarkation.

Funds were not available for the building of a quarantine station at Cebu. Animals landed there are cared for in the corrals of the owners.

Temporary quarantine stations have been maintained at Lemery and Taal. As these points are the gateways to Batangas

and Tayabas Provinces, all animals coming from adjacent islands and provinces can be inspected and the spread of diseases largely prevented. During the latter part of the year, however, the men on duty at these points were withdrawn, owing to the fact that there were no funds available to pay their salaries. They will be replaced early in the next fiscal year.

A temporary station was established at Nozo, on the trail between Nueva Vizcaya and Pangasinan in order to protect the Province of Nueva Vizcaya against the disease which has broken out in Pangasinan. Carabaos and cattle passing over this trail to Nueva Vizcaya are detained for a period of five days. This quarantine has been effective so far, as rinderpest has not yet appeared in Nueva Vizcaya.

SERUM LABORATORY.

In October, 1908, the new buildings for housing the serum herd and the new serum laboratory at the Alabang stock farm were completed and the serum herd moved to the farm. This farm is located in Rizal Province 22 kilometers from Manila, on the line of the Batangas Railroad. The laboratory is constructed of reinforced concrete and has proven highly satisfactory. The bullock shed is of simple open construction, with iron roof and concrete floor. It is built in the form of an E, with a capacity practically double that originally intended. It is capable of holding 278 bullocks; aside from its box stalls for animals requiring special attention. Proper drainage has been provided, so that all water is carried from the concrete floors into gutters which lead into an underground sewer emptying some distance from the shed; thus reducing the danger of infection in case disease should break out among the herd. Pure water is supplied from an artesian well on the other side of the river.

A steam boiler has been located about a hundred meters from the laboratory for the purpose of furnishing steam for sterilizing, etc., as well as steam to cook the animals killed for virulent blood and those which die from various other causes. It is the intention to thoroughly cook these animals and use the cooked meat for fertilizer or feed as it may be required. It is estimated that this will result in a saving, because it costs a considerable sum to burn or bury virulent blood animals, and even after they are buried dogs sometimes dig into the trenches and spread the contagion through the barrios near the farm.

The production of serum was interrupted several times during the year by the appearance of foot-and-mouth disease in the herd. While the outbreaks did little damage to the animals in

the herd there was considerable falling off in the amount of serum produced. In spite of these difficulties, however, 3,495.5 liters of serum were sent to the Bureau of Science, as compared with 1,800.9 liters for the previous year. Excellent results have been secured in separating the serum from the coagulum. Accurate records show a separation of 38.38 per cent, the separation for the two previous years being 22.7 per cent and 28.6 per cent, respectively.

Only 7.4 per cent of the animals used for the production of serum were lost during the process of immunization. Ninety-eight animals were expended in securing virulent blood. Most of the animals used for virulent blood purposes were native cattle. The cost of maintaining these is comparatively small owing to the fact that they subsist largely on hay or native grass.

ALABANG STOCK FARM.

Alabang stock farm was in charge of Mr. Harold M. Knight from the beginning of the fiscal year until September 1, 1908, at which time he was succeeded by Mr. J. B. Thompson, who returned to the United States about January 1, 1909, and was succeeded by Mr. H. J. Gallagher, formerly superintendent of La Granja modelo.

The rainfall at this farm during the last two years has been rather remarkable in that it has frequently happened that for days at a time, at the beginning and close of the dry seasons, it would be raining near the mountains to the south and in Manila while at the farm it would be perfectly dry. This is probably due to the wind currents, which are more or less influenced by the position of the mountains. This marked dry period necessitates more or less irrigation in order to grow crops successfully. For this purpose two artesian wells have been dug on the farm. The first one dug gives an abundance of water at all times; in fact, a 6-inch pump running for ten hours per day and for six consecutive days failed to lower the water appreciably, the water standing within about 9 feet of the surface. From this source we have been able to irrigate something like 12 hectares of land during the past season and have made ditches for irrigating twice that much during the coming dry season.

It was thought for a while that guinea grass would not thrive on the stiff clay soil at this place, but by carefully preparing the land and making a liberal application of stable manure it has grown about as well as in Manila. The area being planted to guinea grass is being extended and we hope that in the near future we will have a sufficient amount growing to supply all the green grass needed.

During the dry season the lowland along the river was planted in sorghum. This was planted in an open trench and irrigation water turned in to thoroughly wet the soil and sprout the seed. The high ridge between the rows did not become moist enough to sprout the grass, hence the crop of sorghum was grown without a single cultivation. The yield of fodder from this crop was very heavy.

Sorghum, corn, and teosinte grow well on the hill lands during the rainy season and large areas of these crops are planted for feed during this time. As the land on which this farm is located had not been under cultivation for a long time (ten or twelve years), wild native grasses had secured a good start. It required considerable heavy work with steam plows to kill out the cogon grass and bring the land into a thorough state of cultivation. Some of the fields were plowed as many as three times. Much more of this work will have to be done before a sufficient area is under cultivation to supply all the feed that is required for the animals kept on the farm.

This farm has been visited during the year by a number of swarms of locusts, which have caused considerable damage to growing crops. No other insect pests have done serious harm.

A number of buildings have been completed during the year and a few more will be necessary to house all the stock and provide quarters for the men before the farm can be considered in good working order. Among the buildings completed are a dairy and goat barn, thirteen new houses for laborers, and a dwelling house for the superintendent and other employees located at the farm. A concrete tank holding 24,000 gallons of water is located on a hill 90 feet high, to supply water to all the buildings on the farm. The barn room is not sufficient to properly house all the horses kept at this farm and it will be necessary to provide some additional shelter in order to take care of the increase in young stock each year.

The American and Australian cattle kept at this farm have not done well in spite of the fact that they have received at all times a liberal ration of concentrated feed. The amount of milk given by the cows is about one-half what it would have been in the United States under similar circumstances. The young calves are always weak and many of them die before the weaning period, while the mestizo calves and Chinese cows have kept in good condition upon nothing but native grass, even during the dry season. A sufficient length of time has been given to this matter to settle practically once for all the question of growing pure breed cattle from the temperate zone, and it is

recommended that no further attempt be made to grow this class of cattle, but to confine our efforts to the growing of mestizos, using the Chinese or Spanish cows and high grade mestizo or full-blood American or Australian bulls.

Since the first of the fiscal year our horses have been increased at this farm by transfer from the Army of 33 mares, 42 colts, and 1 stallion. These animals were received in fairly good condition, but some of the colts had strangles which spread among the other horses on the farm causing considerable trouble and the death of 5 colts during the year. This Army stock was transferred to the Civil Government at an appraised valuation with the understanding that all animals raised are to be offered to the Army at an appraised valuation as soon as they are old enough to be of service as mounts. The valuation of these animals is fixed by a committee of three, one of whom is appointed by the Director of Agriculture, one by the Quartermaster's Department, and the third member selected by these two. Young stock returned to the Army will be appraised in the same way. Many of the mares taken over from the Army for breeding purposes are coarse and rough and are not at all desirable for the production of first-class colts, but the worst of these can be weeded out and within a few years a well-selected lot of animals can be gotten together. A policy has been adopted of confining the breeding work on each of the farms to certain lines. For example, it is intended to confine the work on the Alabang stock farm to the production of full-blooded American colts and others known as Native-American colts; in the first instance using American sires, such as Morgan, and American mares, and in the second place using a large type of native stallion and American mares. Only a small percentage of American mares will be used in the production of full-blooded American colts.

The pure-breed Maltese goats, as mentioned in our previous report, have not developed as satisfactorily as it was hoped. The young goats are very delicate and many of them do not survive the first three months. The half-breed Maltese goats are much better, however; they require less feed and a greater number of the young reach maturity. The milking qualities of these goats have not come up to expectation, probably for the same reason that the pure-bred American cows do not do well here. At the beginning of the fiscal year we had in our flock two imported Spanish female goats. These were both splendid milkers and did well. Accordingly, another lot was ordered from Spain, which arrived on June 4, 1909, consisting of 17 goats, 3

full-grown males, 12 females, and 2 kids. These have not been here sufficiently long to say anything definite as regards their adaptability, but, judging from the appearance and the development of the two that the Bureau has had for some time, it is hoped that they will prove highly satisfactory. During the coming year some 25 large female native goats will be purchased for the purpose of raising mestizo Spanish and Maltese goats for distribution among the farmers in the provinces. Nearly every farmer in the provinces has at least a few goats and anything that can be done along the line of improving these will be of great value to the people.

While the full-blooded American horse and the full-blooded American cow do not thrive well in this country, the American hog seems to be perfectly at home. Apparently he is able to adapt himself to the country and conditions without any trouble. The young develop well and grow rapidly; in fact, some of the young pigs sent out from this farm have been as fine a type of Berkshire as one would wish to see. The breeding herd on this farm has been doubled during the past year and it is expected that during the coming year it will be again doubled. New stock will be introduced and an attempt made to supply the demand for young Berkshire pigs. These animals are sold without difficulty at about the same price they would bring in the United States and, barring diseases such as hog cholera, it is confidently expected that this branch of farming will probably be the best paying of any undertaken and do more good to the people, as the hog, like the goat, is found in every barrio and on every farm. The native farmer is particularly proud of his hogs, hence, they are fairly sure of good treatment wherever they are sent.

The growing of guinea pigs at this farm for use at the Bureau of Science has proved a comparatively easy matter. Guinea pigs are easy to raise, requiring only a good quality of *zacate* and proper attention as to keeping the nests and houses clean. During the year 1,022 guinea pigs have been used by the Bureau of Science.

The raising of rabbits for scientific purposes has not been so successful. Very few of the young Japanese rabbits survive the first weeks and a comparatively small percentage of those which survive reach maturity. The Australian rabbits do not take kindly to confinement and many of them die *en route* or after they reach the farm. An experiment is being tried in allowing these animals to run out in an open lot where they will have plenty of cover but will be provided with feed, in order to

ascertain whether they will be more prolific under these conditions.

Three stallions, "Handrail," "Thoughtful," and a stallion transferred from the Army have been campaigning in Batangas from February 20 to the end of the fiscal year. The interest in horse breeding has increased wonderfully in Batangas during the time these stallions have been kept there. The man in charge of this work reports that the price of good brood mares has increased 100 per cent during the past year.

TRINIDAD STOCK FARM.

No changes have taken place in the management of this farm, Dr. C. M. Morgan having been in charge during the entire year. Labor conditions at this farm are practically the same as described under the head of the Baguio experiment station. The Igorots, when they remain long enough to become trained, make very good hands with horses and cattle. The price paid for labor is practically the same as at the experiment station.

There has not been any scarcity of feed at this farm during the past year, owing to the fact that rains have been abundant and grass plentiful. A small part of this valley which heretofore has not been used has been fenced for the purpose of pasturing horses belonging to Igorots, in order that the owners may not be at any expense for feeding their animals when left at the farm to be bred. Very little or no forage is grown at this farm, most of the land being in pasture or lots.

One of the grass-covered pony sheds which was in a very dilapidated condition has been replaced by a new wooden structure having a capacity for accommodating 19 horses, with a feed room and open shed 20 by 30 feet for the use of the animals during stormy weather. Three of the cattle sheds which were destroyed by the October typhoon have been rebuilt. The horse barn has been repaired by splicing the posts and rebuilding the rock wall. Some other minor repairs were needed but funds were not available for any further work.

The live stock at this farm consists of horses, cattle, sheep, and goats. The plan for horse breeding has been revised and in future will consist mainly of the production of American-native colts, namely, using an Arabian or Morgan stallion and large native mares. A few full-blooded American mares will be kept for the production of full-blooded American colts.

The horses at this farm have done exceedingly well during the entire year. All the young colts are thrifty and are making

satisfactory growth. The only difficulty that we have experienced in handling these animals has been a lack of shelter during the heavy rains. Considerable work has been done also among the Igorots in encouraging them to breed better horses and take better care of them. Most of the Igorot farmers have horses and take considerable interest in the industry.

The cattle kept at this station consist of a herd of about 40 native cows and a Galloway bull. The offspring are very thrifty and thrive on the pasture, requiring comparatively little help by feeding except during the baguios and continued rainfalls. A good many of the mestizo bulls have been scattered throughout the provinces and good reports come from them wherever they have been placed.

During the latter part of the fiscal year seven Nellore cattle, consisting of six cows and a bull, were sent to this station for the purpose of testing their value in the mountain districts. A fuller description of these cattle will be found in another part of this report.

The flock of sheep kept at this farm consists of nine Southdown ewes and a ram. These have been doing very well, except that the quality of wool produced is not very good on account of the excessive rainfall which tends to make it rather coarse.

The goats kept at this farm are of the Angora breed. They have thrived very well, as goats do in all parts of these Islands. Since there is no particular reason why these goats should be kept at this farm and since the expense of keeping any animal here is considerably greater than at other farms nearer sea level, arrangements have been made for the transfer of these goats to the Alabang stock farm where the other breeds of goats are kept. Taking everything into consideration, the prospects for live-stock raising at this farm are very encouraging.

NELLORE CATTLE.

During the latter part of the year the Bureau received a small shipment of Indian cattle, consisting of 10 cows and 2 bulls, all choice specimens of the Nellore breed, the majority being prize winners at the annual cattle show held at Ongole, Madras Presidency. The bulls are very fine specimens weighing about 570 kilos each and stand about 164 centimeters in height. They are of light fawn color with dark points, having very fine, soft hair and loose flexible skin. The females weigh about 365 kilos each and stand about 153 centimeters in height. They have the same quality of hair and skin as the males but are a little lighter in color. The high head,

prominent hump, straight back, and general trimness combine to give these animals a very majestic and pleasing appearance. They are admired by all lovers of good animals.

A short description of this breed of animals is as follows: Head in general comparatively small, short and broad with fine muzzle; mouth small; nostrils comparatively large but not coarse; eyes large and bright; ears long and drooping; horns heavy and curving upward; neck broad, short, and deep; hump very prominent, especially in the male, where it stands some 8 inches or more above the neck; shoulders compact, especially at the top; dewlap excessively developed hanging, in some instances, below the knees; legs long and clean, giving evidence of good quality; feet small; hoofs of good texture; chest deep and fairly broad; ribs long and arched; back very straight and fairly broad; loins extra long and deep; flanks full and low; hips small but a little narrow; rump short and drooping; thighs long and heavily muscled; tail long and tapering, brush heavy. The hind legs seem to be a little longer than the fore legs, causing the animal to be higher at the top of the hip than at the point just back of the hump. These cattle have long been noted for their pleasing appearance, large size, and wonderful ability to withstand hard labor. They have been introduced with success into Java, the West Indies, some parts of the United States, Brazil and other countries. The cattle tick seems to bother them very little; in fact, it is very seldom a cattle tick is found on these animals even though they may be in a pasture badly infested with them. They have the advantage over ordinary Chinese cattle in that they are heavier, swifter in action, and more easily managed. If they adapt themselves to Philippine conditions it is expected that they will do a great deal toward solving the problem of securing work and road animals in these Islands.

PORT OF MANILA.

During the fiscal year ending June 30, 1909, a total of 103,679 animals were inspected on arrival at this port. Inspection fees amounting to ₱17,422.30 were collected on 102,379 animals. One thousand three hundred animals were inspected without fees, as they were for the military and branches of the Civil Government. Certificates of health were issued for 13,843 animals leaving the city of Manila. The health of the animals in this city has been very good except for an occasional outbreak of foot-and-mouth disease and rinderpest. Most of these outbreaks have been small and comparatively easy to control.

PORT OF ILOILO.

During the fiscal year 9,312 animals were inspected on arrival at this port and 2,865 were inspected before removal. No fees were collected. Of the 509 head of cattle and 585 head of carabaos arriving from foreign ports, 118 head of cattle and 39 carabaos were found diseased. No serious outbreaks of disease occurred at this port during the year.

PORT OF CEBU.

During the year 4,327 animals from interisland ports and 649 from foreign ports were inspected upon arrival. Certificates of health were issued for 491 animals leaving the city. No fees were collected at this port.

INSPECTION AT THE ABATTOIR.

The Bureau has continued during the year the ante-mortem and post-mortem inspection of animals at the *matadero* in Manila. This work required about half the time of one veterinarian and three live-stock inspectors. During the year 93,939 ante-mortem and 90,229 post-mortem inspections were made, 914 whole carcasses and 86,364 parts of carcasses were condemned as being unfit for human consumption. No fees were collected by the Bureau for this work.

ADDENDA.

There are attached to this report a number of exhibits containing matter which relates to work of this Bureau but is not of sufficient importance to be embodied in the regular report.

Very respectfully,

C. M. CONNER,
Acting Director of Agriculture.

The Honorable,

the SECRETARY OF THE INTERIOR, *Manila, P. I.*

APPENDIX.

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EXHIBIT A.

The following changes have been made in the personnel during the year:

APPOINTMENTS.

Name.	Class.	Date appointed.
John L. Gross	Veterinarian	Sept. 28, 1908
Paul H. Burnett	do	Oct. 19, 1908
Clarence S. Bucher	do	Oct. 28, 1908
Walter A. Korb	do	Do.
Burstrand J. Eng	do	Do.
Stephen O'Toole	do	Nov. 16, 1908
T. Irving Miller	do	Mar. 5, 1909
Henry F. Hungerford	do	Mar. 27, 1909
Clifton B. Shoemaker	do	Do.
Fred J. Lauman	do	May 6, 1909
Harriet Hayes	Clerk	Oct. 12, 1908
Alfredo Amorsolo	do	Feb. 1, 1909
Francisco Guerra	do	Do.
Abbie Allen	Stenographer	Jan. 4, 1909
David B. Mackie	Assistant agricultural inspector	Jan. 17, 1909
Orange B. Burrell	Agricultural inspector	Mar. 13, 1909
José G. Sanvictores	Agricultural assistant	Mar. 1, 1909
Silverio Apostol	do	Apr. 14, 1909
Mariano M. Cruz	do	Apr. 21, 1909

TRANSFER TO THIS BUREAU.

Name.	Class.	Date appointed.
Thomas L. Bean	In charge small animals	July 1, 1908
Ignacio V. González	Clerk	July 1, 1908
William D. Hobart	do	Jan. 8, 1909
Sam. E. Sherard	Agricultural inspector	Feb. 1, 1909
Ernest A. Coddington	Superintendent of publications	Feb. 17, 1909
William E. Cobey	Chief clerk	Apr. 12, 1909

RESIGNATIONS.

David G. Moberly	Veterinarian	Oct. 6, 1908
Eugene J. Snyder	do	July 4, 1908
Alonzo S. Shealy	do	Mar. 20, 1909
Harry A. Forester	do	Apr. 12, 1909
Clarence S. Bucher	do	May 13, 1909
F. L. McVeigh	Cashier and disbursing officer	July 31, 1908
A. W. B. Frederick	Farm foreman	Nov. 30, 1908
Victor Buencamino	Clerk	Sept. 12, 1908
Sylvia S. Kennedy	do	Dec. 27, 1908
Sixto S. Sandejas	do	Mar. 10, 1909
Harry E. Stevens	Agricultural inspector	Mar. 19, 1909

TRANSFER FROM THIS BUREAU.

Harold N. Knight	Farm superintendent	Sept. 10, 1908
José G. Sanvictores	Agricultural assistant	May 29, 1909
Harold Guzner	Agricultural explorer	May 31, 1909

REINSTATEMENTS.

David G. Kretzer	Veterinarian	Sept. 28, 1908
F. L. McVeigh	Clerk	Feb. 10, 1909

There has been a gain during the year by appointment of 28, and a loss by resignation and transfer of 14, making a net increase of 14. The employees both permanent and temporary, other than day laborers, who have been in the service during the year number 150. The average number of employees has been 69.

EXHIBIT B.

AGRICULTURAL EXTENSION WORK.

BY PABLQ TECSON.

Upon recommendation of the municipal council of San Miguel, Bulacan, an abandoned system of irrigation situated in the barrio of Kinamatayang-Kabayo was inspected during the last days of June, 1908, with a view of ascertaining the extent of territory and the number of owners of arable land which would be benefited by reconstructing and extending the system.

This system of irrigation was constructed during the years

1894 and 1895 by a resident landowner of the municipality of San Miguel, but on account of the unsettled condition of the Government which prevailed for some time after this, the system was neglected and partially reverted to its original state. For economic reasons the person who constructed the system signified his willingness to cede to the Government whatever right he had to the system, provided that the Government would reconstruct and improve it.

An investigation of the surrounding country shows that an area of 4,000 hectares valued at ₱1,000,000, owned by one hundred and fifteen different parties and extending through the municipalities of San Miguel, Bulacan; Candaba, Pampanga; San Isidro and Gapan, Nueva Ecija, would be benefited by this system of irrigation. While the water supply during the dry season might be somewhat limited, the system of irrigation could be so constructed as to provide a reservoir which could be built at a small expense, thus insuring ample water supply for irrigation throughout the year.

A trip through the municipalities of San Fernando, Mexico, Arayat, Candaba, San Luis, San Simon, Apalit, Macabebe, Masantol, Magalang, Mabalacat, Angeles, Porac, Bacolor, Sta. Rita, Guagua, Lubac and Floridablanca made during the month of September, 1908, revealed that agricultural conditions in Pampanga were quite prosperous. The principal products of the towns visited are sugar, rice, and corn, the cultivation of which, while hampered by the scarcity of work animals, was by no means neglected. It was gratifying to note the almost total absence of animal diseases, there being reported only an occasional case of *glosopeda*.

There are certain creeks in the province which would afford a bountiful supply of water for irrigation, thereby rendering possible a double harvest of rice where now only one crop is taken. Some of these as they now exist are destructive, since they overflow their banks and damage crops during the rainy season.

Upon the report of the prevalence of disease attacking coconut trees in the Province of La Laguna, the superintendent of agricultural extension work proceeded to the municipality of Nagcarlan throughout whose barrios there was discovered the existence of bud rot and a disease which manifests its presence by the appearing of black spots on the roots and trunks of the trees. The owners of the coconut groves were using as a remedy for bud rot a solution of vinegar by applying it to the bud after having cut away the infected part. This treatment gave little or no result.

The trees affected by the other disease above described were treated by cutting away the spots which appeared on them. The result was that the trees soon dried up and died.

Cutting down and burning all infected trees was recommended as a precaution against the spread of these diseases.

Information was received that rinderpest and other contagious animal diseases were fast spreading through Nueva Ecija on account of the negligence and carelessness of the people in disposing of sick and dead animals. When the report was investigated, in coöperation with the veterinary force, it was discovered that in the barrio of Baluarte of the municipality of Gapan, the apparent center of infection, the inhabitants not only made no attempt to isolate sick animals from healthy ones, but neglected to bury or otherwise dispose of dead animals. This matter was taken up with the executive officials and resulted in their adopting energetic and adequate measures to aid in preventing the spread of diseases.

An investigation was made of the agricultural conditions of Bataan in the month of December, 1908, during which it was observed that rice and sugar cane were the principal products, the former being harvested three times a year. More extensive cultivation of coconuts, cacao, coffee, and oranges was recommended on account of the adaptability of the sandy soil of the province to their production.

During the month of January, 1909, the specially organized provinces of Palawan and Siquijor were visited for the purpose of making a study of their products and the methods used in cultivating them.

It was learned that the principal agricultural product of Palawan is rice. However, the extensive virgin arable lands consisting of plains and highlands are very adaptable to raising sugar cane and corn. The greater portion of this land is used for pasturage. The number of cattle raised exceeds the local demand and an appreciable number is exported from that province annually.

The agricultural products of the Province of Agusan are chiefly hemp and coconuts. There are sections of the country well suited for the cultivation of rice, but this crop is harvested in very small quantities due to the scarcity of work animals with which to till the soil.

The soil of the subprovince of Siquijor is poor and stony, which renders its use for cultivation almost absolutely unprofitable. Rice is grown in some parts, but corn is the principal product of the island and forms the main article of food for the inhabitants.

The subprovince of Bukidnon is quite rich in the production of abaca, cacao, and coffee. An inspection of these crops in the *rancherías* of Tankalan, Maloko, Impasug, Malay-balay, and Sumilao disclosed the fact that the coffee and cacao trees were planted too closely together to yield the harvest which the fertility of the soil would otherwise afford. The attention of the farmers was called to this condition and they were advised to plant their trees at a distance of 4 meters, one from the other, instead of 2 meters as was their custom.

SPECIAL WORK.

During the year steps were taken to ascertain whether there exist or have existed amongst the farmers economic coöperative societies. To this end and in conjunction with other investigations a circular letter was addressed to all provincial governors. From the information received it would appear that no society of this kind has ever existed. There are, however, a number of societies of a quasi-coöperative character, such as one which owns and operates a steam rice mill and another a rice thrashing machine; both are located in the Province of Bulacan.

These societies are composed of a few farmers who established these machines in their localities, first, for the preparation of their own crops for market and, second, for the preparation of the crops of others by charging a toll.

Amongst the abaca planters of Mindanao there is an organization known as "The Davao Planters' Association" to which, it is understood, the majority of the planters belong. This association not only fosters and stimulates the cultivation of hemp but looks after and defends the interests of all its members, both individually and collectively.

The superintendent of agricultural extension work was delegated to represent the Bureau of Agriculture at the second annual meeting of the agricultural congress of Panay and Negros, held at Iloilo on January 30 and 31 and February 1, 1909. During the sessions of this congress the question of recommending to the Philippine Legislature the establishment of a corps of veterinarians and the purchase of foreign breeding animals was open for discussion. The Bureau's representative availed himself of this opportunity to inform the three hundred farmers and business men present of the successful results obtained by its veterinary force in combating animal diseases throughout the provinces. The congress was likewise advised that the Bureau of Agriculture owns animals carefully selected for breeding qualities, for improving the native breeds of animals.

EXHIBIT C.

REPORT OF MR. DAVID B. MACKIE ON RAT EXTERMINATION.

MANILA, June 30, 1909.

SIR: I have the honor to submit the following report pertaining to the investigation of rats in southern Luzon and their relation to the rice crop:

During the month of January letters were being received at the Bureau signed by presidents of municipalities stating that unless some preventive measures were adopted the entire rice crop would be a failure, owing to the devastation caused by rats. Urgent letters were received from the presidents of Pañgil, Province of Laguna; Calolbon, Catanduanes; subprovince of Albay; and Bacon and Juban, Province of Sorsogon.

Under instructions from the Director of Agriculture, I started on January 29 to investigate the condition of the rice crop in Pañgil, Laguna Province, arriving the same day in Santa Cruz. There the rice crop was in fine condition and I could see no evidence of inroads from rats. On Sunday, January 30, I proceeded to Pañgil and told the president that I had come in answer to his letter of the 21st to investigate the rat plague of which he had spoken. He then said that the rats were doing no damage to the crop in Pañgil but that damage was being done in the barrio of Matiquio on the other side of the lake.

The paddy fields of Pañgil are located on the border of the lake on very low land, and after a rain storm are more or less submerged, which tends to keep the rats out of them. The crop in this municipality was just beginning to ripen and to all appearance was a very good one.

On Monday morning, January 31, I crossed the lake to Matiquio. Here the conditions were unusual, the barrio being very small and the paddies, which were hardly more than 3 hectares in extent, containing clumps of bamboo which offered admirable nesting places for the rats. The rice crop was being harvested and there was ample evidence of destruction by this pest. Poisoned bait, consisting of rice boiled in water containing strychnine and afterward coated with a sugar syrup, was used. The next morning it was clear that the bait had been visited and partly eaten, but no dead rats were found.

On February 1, I returned to Santa Cruz and from there I visited the rice fields of Pagsanjan and other barrios, returning the following day to Manila.

On February 2 I received an order to proceed to Virac, Catanduanes, Province of Albay. Leaving Manila on the 5th, I arrived

at Albay on the 7th. From that time until the 15th I examined the rice fields of Albay, Daraga, and adjacent barrios. On the 15th I left Albay for Calolbon.

At Calolbon the crop seemed to be in good shape and although I set out a number of traps the first day in holes that the people said were inhabited by rats I was unable to secure any specimens. The next day, however, I secured in one of the barrios a pair of adults and a nest containing three young ones. The adults measured, respectively, 426 millimeters for the male and 397 millimeters for the female. The nest which was located in the top of a hollow post was composed of grass and contained three large young, a male and female of which were secured. This species is a uniform reddish gray on the back and lighter underneath and closely resembles, and probably is, the common house rat (*Mus norwegicus*). The next morning what is apparently another species was caught. This specimen was reddish gray on top and whitish underneath.

On February 21 I returned to Virac, and from then until March 4 I examined the paddies in the barrios of Antipolo, Santa Niña, Taytay, Cogon, San Vicente, and Cabugao. With the exception of Antipolo, which reported damage from ducks, the crops were generally good. At Antipolo I secured a specimen of these ducks, which are small brown ones with blackish bills. The breasts and underparts are of a uniform brown, the backs being almost black and the individual feathers being margined and tipped with lighter color.

On March 4 directions to proceed to Bacon, Sorsogon, were received. The same day I left Virac and proceeded to Legaspi and from there to Bacon. Arriving at Legaspi on the morning of the 5th, I went from there to Bacon on the 6th. Leaving Legaspi by prao at 7 a. m. we arrived in Bacon at 11 p. m., the delay being due to contrary winds and the capsizing of the boat. On Sunday, March 7 I examined the paddies for evidence of rats. There were some signs of them but upon closer examination most of the damage was found to have been the work of larvæ of a small moth which bore up the inside of the stalks and on reaching maturity gnaw their way out, causing the stalks to fall, thus giving the impression that it was the work of rats.

The larvæ, which vary from 13 to 17 millimeters in length, are of a transparent greenish color with a double row of lateral reddish brown spots. The head is dark red-brown. Two posterior segments have a row of eight small reddish dots extending laterally across the dorsal surface.

Traps were set for rats and three specimens of the same species as that taken at Calolbon were secured.

On March 24 I sailed for Virac, arriving there the following afternoon while the rice crop was being harvested. From March 26 until April 4 was spent in studying the crops in the different barrios of Virac.

On April 4 I started on a tour of the northern towns of Catanduanes for the purpose of obtaining reports on the crop and securing specimens of the reported plagues.

From April 5 to 17 I spent in Bato and its barrios. The people in this locality reported a good crop with little damage by rats. At the barrio of Baras I was told that ordinarily the rats do very little damage except in an unusually dry season. It was also stated that in the seasons of 1904 and 1905 there had been some damage done by rats, but this season there were present indications of a good crop.

As I journeyed northward signs of destruction by rodents became more manifest. At Tambognon, a barrio of Viga, a number of specimens were taken and reports of damage were received. These specimens were of the common large gray rat that had been taken before, probably *Mus norwegicus*. The *tenientes* of the barrios reported that more damage was being done by ducks than by rats. On April 21 I secured specimens of the former and believe them to be *Dendrocygan arcuata*, a small brown duck which is common throughout Luzon and adjacent islands.

I arrived at Viga on April 24. At this municipality the people were just harvesting the rice crop and there was evidence of considerable damage by birds and rats. Here I secured many specimens, the majority being of the large gray rat before described. I also secured a specimen of a small brown rat which I have never taken before. This specimen was an adult male and measured from tip of nose to tip of tail 240 millimeters, the body being 110 millimeters and the tail being 130 millimeters. This is probably an undescribed species and, I believe, rare as it was the only one taken on the entire trip. Here we also secured specimens of a larger duck, probably the *Anas luzonica*. This duck and the species taken at Tambognon were both present in great numbers, some of the flocks aggregating five or six hundred. They spent the day on the sand bars of the river, and at twilight would come into the rice fields where they would settle in bunches of four or five and commence feeding. They evidently came and went throughout the night, as often after midnight I could hear flocks passing over, making a loud whistling noise with their wings.

Much damage was also done by the rice finch (*Munia jugari*), a small brown and black finch with a bluish bill. These little pests do the most harm when the rice is in the milk. They feed during the day but are most destructive during the early dawn and at twilight. They are gregarious and settle on the stalks in thousands. In the barrio of Oco I saw one particularly large flock, which I should estimate contained two or three thousand. The natives erect mats on poles to frighten them off, but I do not believe that this method is very successful.

On May 29 I visited the barrio of Bagamanoc. Here I found rats more prevalent than in any other barrio. The rice crop had just been harvested and the rodents were extremely hungry. I set twelve traps baited with corn. Every night I would catch at least ten rats which in turn would be eaten by others. From this experience I should judge that after the rice is harvested would be the best time to deal with the pests, as they are suddenly robbed of most of their food supply and are very hungry. In this barrio I also secured a new specimen. This specimen was an adult pregnant female containing six young. The measurements were: total length 223 millimeters, body being 126 millimeters and tail 97 millimeters. It was gray on the dorsal region, shading to white on the ventral.

On June 4 I left Bagamanoc for Pandan. Here the president told me that owing to rats, birds, snakes, and lizards they had been unable to harvest a good rice crop for six years. In this municipality specimens of the same large gray rat were taken, but not in great numbers. Here the natives told me that since the rice crop had been harvested the rats had taken up their abode in the houses. There is much truth in that, for whenever I placed traps in the house I secured specimens of this variety. Here I also secured specimens of another species of rice finch, probably *Urolonca everetti*, that was doing considerable damage; also specimens of a weevil and a specimen of rice fungus.

On June 12 I visited Caramoan, a barrio of Pandan. Here they reported damage by rats, but stated that it was not extensive. On June 15, having completed the survey, I sailed for Virac, stopping en route at three other barrios which, however, raised very little rice and reported no damage. I arrived at Virac on June 18 and on the 22d sailed for Manila, arriving there on the 26th.

Respectfully submitted.

DAVID B. MACKIE.

DIRECTOR OF AGRICULTURE, Manila.

EXHIBIT D.

LEGISLATION AFFECTING CROP-REPORTING STATISTICS.

Act No. 1898, passed by the Legislature at its last session, will greatly assist in obtaining correct statistics. Under its terms it is now the duty of presidents of municipalities created under Act No. 82, a general Act for the organization of municipal governments in the Philippine Islands, to give quarterly returns of the animals and crops in their respective municipalities on blank forms to be furnished by the Director of Agriculture. The law provides that these shall be substantially the same as the monthly reports which have been in use up to the present time.

In the intervening months, for the purpose of keeping this Bureau in touch with agriculture conditions, the presidents will be asked to fill in a brief form reporting diseases of animals, any injury to crops from weather or pests, general condition of growing crops, and local prices of crops.

NEW STATISTICAL SYSTEM.

With the more accurate statistics which it is confidently expected will be obtained under the new law, it is proposed to inaugurate a card system for classifying in detail all the information received so that it may be readily available for reference. To this end the modern method of charts will be largely used, enabling a person at a glance to tell the status of crops or animals in any municipality for each quarter. Other charts will group the municipalities of each province together, so comparisons can readily be made between provinces. There will also be an insular chart.

COÖPERATION OF PRIVATE INDIVIDUALS.

At the present time about half the correspondents of this Bureau are municipal presidents and half private individuals. For the purpose of uniformity it is planned to send blanks to municipal presidents only, beginning with the monthly forms for July. Where, as in a large number of cases, private correspondents have given their time and in many instances gone to expense in collecting accurate information that has been highly appreciated by the Bureau, they should deem it no reflection upon the individual if the law-making authorities have deemed it best, looking over the whole situation, to have future reports drawn up by municipal presidents, who will not only be able to call upon all officials and employees working under them for information, but to make use of their clerical force in putting it into shape for transmittal.

It is hoped that the private correspondents of the past, many of whom have done such good work, will not relax their efforts but will coöperate with the presidents in their respective municipalities and put at their disposal the information they have formerly sent direct to this Bureau.

EXHIBIT E.

LEGISLATION AFFECTING TOBACCO BOUNTIES.

With a view to encourage small planters of tobacco to grow more marketable leaves per hectare; to sort it more uniformly as regards the size, quality, coloring, etc., of the leaves; and to cure it in the manner best suited for the manufacture of cigars, etc., Act No. 1767 became a law on October 11, 1907. This Act provided for bounties to be given in the Provinces of Cagayan, Isabela, and La Union each year to the tobacco planters who excelled in the above-named respects, and made available an annual expenditure of ₱5,000 in other tobacco-growing provinces under the direction of the Governor-General.

This law was first operative for the calendar year 1908. The committee appointed in the Province of Cagayan and the Province of Isabela gave very careful consideration to the question of the best methods for distributing prizes and in their report stated that it had been found that the grower of tobacco did not cure it for the market but sold it in *manos* to those who did; and, therefore, advised that no bounties be awarded to the third class mentioned in the law. It was also found that a very limited area in each province produced the best tobacco and it was therefore hopeless for planters in other districts to compete for a prize; so they advised that each province be divided up into not to exceed four districts with reference to the quality of tobacco grown. With no change in the amount of money to be distributed in a province this would result in much smaller prizes, but this was considered an actual advantage, eliminating any incentive to fraud. It was also found that certain administrative expenses were necessary in carrying out the law and they recommended that the amount of these be deducted from the bounty fund. The reports of the committee in Cagayan and Isabela were supplemented by a very comprehensive personal report of Mr. H. E. Stevens, the representative of this Bureau on both committees.

* No planters qualified for the prize to be given to those growing and curing tobacco, but first, second, and third prizes were given to those growing the greatest number of leaves per hectare and to those packing the leaf most uniformly.

In the Province of La Union the committee appointed decided that the growers had not qualified for prizes through failure to conform to the terms under which they were to be given, so no prizes were awarded by the committee in this province.

By Executive Order the sum of ₱900 was set aside by the Governor-General for bounties in the Province of Iloilo, beginning with the calendar year 1909.

The committees to award tobacco bounties are composed of the provincial treasurer, a representative of the Bureau of Agriculture, and a third member chosen by the other two who must be a planter or a dealer in tobacco.

The recommendations made by the committees in Cagayan and Isabela, the advantages of which were explained at length by Mr. Stevens, were heartily concurred in by this Bureau. The attention of the delegates to the Assembly from tobacco-growing provinces was invited to the correspondence and recommendations, resulting in the passage of Act No. 1917 amending Act No. 1767 along the lines recommended, and putting the administration of the bounties into the hands of the Director of Agriculture, subject to the approval of the Secretary of the Interior.

The law as amended makes the same amounts available for bounties as heretofore, omits the third class (those who both grow and cure tobacco for the market), divides provinces into not to exceed four districts under the supervision of the Director of Agriculture, subject to the approval of the Secretary of the Interior, and allows for administrative expenses from the general fund allotted to each province.

It is hoped that a large number of tobacco growers will make an effort to get a prize for which, under the amended law, all will stand upon an equality.

EXHIBIT F.

AGRICULTURAL EXPLORATION.

BUD ROT OF COCONUTS.

Upon advice that bud rot existed in Laguna and Tayabas, a general inspection was made of the coconut groves of these two provinces along the road between the towns of Lucena, Candelaria, Tiaong, San Pablo, and Nagcarlan. No disease was discovered until Nagcarlan was reached. Three days were spent in looking over the situation in this locality. Several infected

trees were found in the barrios of Lasaan, where the loss from bud rot had been considerable. The infected trees were also found in Pagsanjan and were cut down and their buds burned with oil.

It was decided, after this brief inspection, that a vigorous campaign should be inaugurated against the disease and steps taken to destroy, if possible, all diseased trees and burn infected buds with petroleum. Accordingly, Mr. A. F. Byars was detailed upon this work. He was assisted by Mr. Silverio Apostol and Mr. Victorino Borja, the party leaving for Santa Cruz on October 22 to begin this work.

Previously a stringent, but very effective, ordinance for aid in the suppression of bud rot had been enacted by the provincial board of Laguna. A similar one was also passed in Tayabas. These ordinances made it obligatory upon owners or any persons in charge of coconut groves to report the presence of the disease on its first appearance to the municipal president, who is made inspector *ex officio* and whose duty it becomes to inspect said trees and order their owners to cut them down and burn the infected buds. Any person who becomes cognizant of the existence of coconut disease in any locality through observation or information and fails to report the same to the president, any president who neglects to inspect and order a diseased tree destroyed, or any owner who refuses to cut down or burn the infected portion of a diseased tree, becomes liable to a fine not to exceed ₱200 or to imprisonment not to exceed thirty days. A law of this kind is most necessary in combating an infectious disease like bud rot.

A close inspection of a number of barrios of Magdalena and Majayjay revealed no case of bud rot. Several active cases of bud rot were discovered in two barrios of Lilio, and in one of these about one hundred and fifty trees were cut down in one day. Almost every barrio of this town was inspected, other towns being worked in a similar manner.

After a little more than five weeks' work the party had given a detailed inspection to the eleven towns of the coconut region of Laguna. Active cases of bud rot were discovered in six of these. It is estimated that one district of Nagcarlan lost ten per cent of its coconut trees during the year.

Nineteen days were spent in inspecting towns of Tayabas going over from Majayjay to Lucban and working the coconut region on the Tayabas slope of Mount Banajao to Lucena on

the coast, south to Pagbilao, then from Lucena back to San Pablo, Laguna. But no conclusive evidence of bud rot was discovered in this territory. Thus a circle of inspection around the infected area was completed, outside of which no disease was found to exist.

While all trees showing symptoms of bud rot at the time of inspection were destroyed, it is quite probable that other trees previously infected by means of wind or insects may develop the disease later on. This calls for a close coöperation of provincial and municipal officials and growers of coconuts in a careful watch of the groves. Presidents of towns, *tenientes* of barrios, and owners of coconut groves have been informed as to the nature of the disease and the manner of its extermination. Much depends upon their efforts along lines indicated to control this disease which, if left alone, may destroy vast coconut wealth.

In connection with the special work on bud rot in Laguna and Tayabas, observations were taken upon the general agricultural conditions in both provinces. Agricultural maps (copies with corrections) were made of the towns of Santa Cruz, Pagsanjan, and Lucena. A collection of ninety-seven agricultural specimens was secured, including plants, insects, and forty-six (?) native varieties of rice. Also all possible data concerning the coconut industry was gathered, such as the cost of the production of nuts and the manufacture of copra, oil, and alcoholic beverages.

In January an inspection trip of nine days was made in Pangasinan and Tarlac especially in the interests of rice and coconuts. In the six towns of Pangasinan visited the coconut groves were in a healthy condition as regards disease and insect enemies, the damage from ravages of the rhinocerous beetle being exceptionally slight. They were not bearing very freely as a result of the baguios a few months previous and the dry weather prevailing at that time. The soil of Pangasinan is well adapted to the production of coconuts and there are good prospects for the development of this industry. In the vicinity of San Fabian young groves come into bearing at a very early age. Samples of more than fifty kinds of native rice were secured in the town of Tarlac.

During the two weeks following March 6, 1909, an inspection was made of the coconuts on the Island of Marinduque. While the climate and soil is suited to successful growth of coconuts, very poor methods of planting are practiced and the loss

entailed from the ravages of the coconut beetle, which kills large numbers of trees, is very great in this subprovince. Nowhere else do the crows seem to be so great a pest; they are especially destructive to the young nuts of the coconut. It was recommended that they be killed by use of poisoned bait. Marinduque was found to be rich in natural resources, the soil being adapted to the growth of a great number of crops. An agricultural map was prepared showing the general distribution of the most important crops and a report upon existing agricultural conditions, with recommendations for more improved methods of cultivation, which was turned over to the subgovernor for dissemination among the farmers.

Beginning March 22, 1909, inspection was made of the three largest islands of the Romblon group—Romblon, Sibuyan, and Tablas.

Practically the whole cultivated area of the Island of Romblon is planted to coconuts. Great damage was done to groves by the terrific baguios that swept this island on September 23 and December 5, 1908. It is estimated that fully 7 per cent of the trees were destroyed outright, uprooted, or snapped off. Production of crops was stopped for six months, while a large number of trees were so nearly denuded of foliage that at least two years will be required for their complete recovery. It was noticed that the loss was greatest among those groves in which close planting and notching of trees was practiced.

On the Island of Sibuyan small crops of coconuts, rice, abaca, and corn are grown; but by far the most important industry is that of stock raising. Plenty of good grazing and a bountiful supply of fresh water is afforded and as yet no infectious animal diseases, such as rinderpest or surra, have visited Sibuyan. Tablas is very similar to Sibuyan, excepting that it is more densely populated and larger areas are planted to corn, coconuts, rice, and tobacco.

A number of agricultural specimens were collected in these islands and brought to Manila.

ORANGES.

At the request of the governor of Batangas, an investigation was made of the orange district of Batangas. The Assistant Director of Agriculture and an agricultural explorer, Mr. Guzner, made a trip through the principal part of the orange-growing section with the idea of ascertaining, if possible, some

way by which the market season of oranges grown in this district could be prolonged, and the quality of the oranges improved. The investigation showed that practically all of the oranges grown in this district are seedlings of varieties known locally as *Naranjita* and *Cajel*. The *Naranjita* predominates, probably because the yield is heavier. The *Naranjita* is a loose-skinned orange of rather larger type than the Japanese tamarind but has a very poor flavor and low density of juice. The seedling trees of this variety grow very tall and make it rather difficult to harvest the fruit. The height of the tree and the quality of the fruit also could be largely improved by selecting the varieties and budding on to grape fruit or wild orange stock.

The *Cajel* is a large round orange resembling in shape the ordinary Florida seedling. Frequently individual specimens are found of fairly good flavor. Were the tree a good bearer this orange would be worth propagating more extensively. No evidence was found of anyone's having attempted to grow the better foreign varieties, neither was there found any evidence of any attempts to propagate by budding or grafting from any of the better trees of the native variety. All groves are propagated by planting the seed in a nursery and transplanting as soon as the young trees are large enough.

The oranges all ripen at practically the same time, hence the market season is short. Little or no cultivation is given to the groves, many of them being allowed to grow up in weeds, bushes, bananas, etc., which tends to sap the life of the trees and reduce the quality of the fruit produced. Insects and disease seem to be quite prevalent, causing considerable damage to the trees.

On March 5, Mr. M. Cruz, a returned *pensionado* student, and an agricultural explorer, made a second trip to Batangas with the idea of holding meetings among the orange growers and talking to them about the value of giving their trees better cultivation and using some judgment in selecting the better varieties for propagation. Practically every barrio of the district was visited during the two weeks' trip and personal instructions given to most of the growers along the lines mentioned above.

The Bureau at present has no expert in citrus fruit growing but it is hoped that in the near future one can be obtained and a small demonstration station can be started in this district where the people can be taught by observation how to handle their trees in order to obtain the best results. This matter was taken up informally with some of the larger growers and they indicated a willingness to place land at the disposal of the Bureau.

for any length of time desired in case it would be used for this purpose. The funds available at this time, however, are not sufficient to carry out this project in the immediate future.

RICE.

Three of the Filipino students recently returned from the United States have been detailed on the work of collecting data relating to rice growing in these Islands, with the idea of collecting samples of the better varieties and making comparative tests at one of the experiment stations.

During the year the names of 2,430 different varieties have been obtained and 828 different specimens have been collected from 30 provinces. Out of these, 200 so-called varieties of lowland rice and 56 of upland rice were selected for comparative tests. They were planted in seed beds on low rice land at Alabang stock farm, about June 20. Irrigation water was supplied in order that the plants might not suffer for water at any time during the growing season. It is hoped by careful comparison to eliminate all duplicate varieties. After varieties have been identified in this manner, seed of those most promising will be secured from the original source, namely, the province in which the seed was first obtained, and grown in more extended areas for further comparisons. In the meantime, the collection of different varieties will be continued at harvest time until the entire Islands have been covered and samples of all so-called varieties obtained.

EXHIBIT G.

STATISTICS RELATING TO DISEASES OF THE ISLANDS.

[Compiled from weekly reports of veterinarians and inoculators.]

Disease.	Number of provinces and sub-provinces reported from.	Number of animals affected.	Approximate number of animals exposed.	Number of deaths.	Number killed.
Rinderpest -----	34	8,605	109,089	6,128	15
Surra -----	18	779	12,438	497	329
Glanders -----	18	312	1,179	56	48
Foot-and-mouth disease -----	23	10,673	1,487	125	-----
Lymphangitis -----	10	100	75	9	-----
Septicemia -----	5	57	2,122	18	-----
Hog cholera -----	4	67	960	68	-----

EXHIBIT H.

TABLES SHOWING THE NUMBER, KIND, AND CONDITION OF CATTLE ARRIVING IN MANILA DURING THE YEAR.

Cattle and carabaos free from disease arriving in Manila from foreign ports, prior to November 2, 1908.

Date of arrival.	Port of embarkation.	Number of animals.	
		Cattle.	Carabaos.
July 6, 1908	Barcelona	1	
July 11, 1908	Australia	4	
July 22, 1908	Phuyen		
Do	Australia	994	
July 25, 1908	Quin Hon	4	
August 5, 1908	Phuyen	146	62
August 6, 1908	Hai How	928	70
August 7, 1908	Camh Ranh	260	
August 9, 1908	Australia	60	84
August 17, 1908	do	10	
August 18, 1908	Quinhon	209	24
August 24, 1908	Pnom Pehn	745	125
September 2, 1908	Camh Ranh	304	71
September 5, 1908	Phuyen	849	125
September 10, 1908	Quin Hon	505	145
September 14, 1908	Saigon and Quinhon	225	32
September 20, 1908	Camh Ranh	67	75
September 22, 1908	Compong Thaches	802	114
September 28, 1908	Phuyen	520	22
September 29, 1908	Australia	8	
Do	Phuyen	12	
September 30, 1908	do	5	
October 4, 1908	Na Thrang	265	103
October 7, 1908	Hongkong	29	
October 10, 1908	Phuyen	619	48
October 12, 1908	Compong Thaches	763	145
October 17, 1908	Phuyen	529	75
October 27, 1908	do	617	56
Do	Hongkong	24	
October 30, 1908	Na Thrang	738	48
November 1, 1908	Australia	2	
	Total	10,254	1,424

Cattle and carabaos arriving in Manila from foreign ports, prior to November 2, 1908, found infected but landed.

Date of arrival.	Port of embarkation.	Number of animals.		Disease.
		Cattle.	Carabaos.	
July 6, 1908	Hongkong	190		"Glosopeda."
Do	do	70		Do.
July 9, 1908	Pnom Pehn	693	109	Do.
July 10, 1908	Hongkong	226		Do.
August 31, 1908	Hai How	300		Rinderpest.
September 28, 1908	do	137		Do.
October 19, 1908	do	600		Do.
	Total	2,216	109	

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Cattle and carabaos free from diseases arriving in Manila from foreign ports subsequent to November 2, 1908.

Date of arrival.	Port of embarkation.	Number of animals.	
		Cattle.	Carabaos.
November 2, 1908	Hongkong	50	
Do	Compong Thaches	452	120
November 8, 1908	Phu yen	667	46
November 14, 1908	Camh Ranh	432	103
November 23, 1908	Phu yen	760	24
November 26, 1908	Compong Thaches	589	72
December 1, 1908	Hongkong	79	
December 5, 1908	Phu yen	650	89
December 18, 1908	Hongkoung	60	
Do	Phu yen	729	34
December 20, 1908	Quin Hon	474	191
December 29, 1908	Hongkong	65	
January 1, 1909	Australia	9	
January 10, 1909	Singapore	4	
January 12, 1909	Hongkong	69	
January 19, 1909	Phu yen	1,056	
February 4, 1909	Hongkong	94	
February 8, 1909	do	109	
February 9, 1909	do	94	
February 11, 1909	Pnom Pehn	706	
Do	Na Thrang	352	114
February 23, 1909	Phu yen	344	120
March 2, 1909	Hongkong	99	
March 5, 1909	do	124	
March 9, 1909	do	229	
March 12, 1909	do	259	
March 16, 1909	do	194	
Do	Australia	24	
March 17, 1909	do	10	
March 29, 1909	Hongkong	121	
April 9, 1909	do	227	
April 12, 1909	Pnom Pehn	140	281
April 20, 1909	Hongkong	129	
April 26, 1909	do	89	
April 28, 1909	Pnom Pehn	530	30
May 4, 1909	Hongkong	179	
May 7, 1908	Singapore	7	
May 9, 1908	Australia	4	
May 17, 1908	Pnom Phen	439	100
June 1, 1908	do	590	80
June 7, 1908	Australia	2	
June 22, 1908	Pnom Phen	302	120
	Total	11,542	1,524

Cattle arriving in Manila from foreign ports, subsequent to November 2, 1908, in good condition but considered infected before arrival.

Date of arrival.	Port of embarkation.	Number of cattle.	Date of first symptoms.	Disease.
November 10, 1908	Hongkong	58	Nov. 13, 1908	"Glosopeda."
December 1, 1908	do	117	Dec. 4, 1908	Do.
January 8, 1909	do	60	Jan. 11, 1909	Do.
January 18, 1909	do	100	Jan. 20, 1909	Do.
January 25, 1909	do	131	Jan. 28, 1909	Do.
February 15, 1909	do	125	Feb. 16, 1909	Do.
February 19, 1909	do	124	Feb. 20, 1909	Do.
March 13, 1909	do	307	Mar. 15, 1909	Do.
March 15, 1909	do	150	Mar. 18, 1909	Do.
	Total	1,172		

Cattle and carabaos arriving in Manila from foreign ports, subsequent to November 2, 1908, found infected—Held on lighter in bay for immediate slaughter.

Date of arrival.	Port of embarkation.	Number of animals.		Disease.
		Cattle.	Carabaos.	
October 31, 1908	Hongkong	54	—	"Glosopeda."
November 6, 1908	do	79	—	Do.
November 9, 1908	do	99	—	Do.
November 13, 1908	do	104	—	Do.
November 16, 1908	do	121	—	Do.
November 17, 1908	do	113	—	Rinderpest.
November 21, 1908	do	116	—	Do.
November 25, 1908	do	108	—	"Glosopeda."
Do	do	38	—	Do.
November 28, 1908	do	119	—	"Glosopeda" and rinder-pest.
December 2, 1908	Anpiu, Formosa	184	14	Rinderpest.
December 5, 1908	Hongkong	142	—	"Glosopeda."
December 7, 1908	do	113	—	Do.
December 9, 1908	do	127	—	Do.
December 12, 1908	do	140	—	Do.
December 13, 1908	do	306	—	Do.
December 14, 1908	do	90	—	Do.
December 15, 1908	do	130	—	Do.
December 21, 1908	do	60	—	Do.
December 22, 1908	do	60	—	Do.
December 26, 1908	do	66	—	Do.
December 29, 1908	do	150	—	Do.
January 1, 1909	do	180	—	Do.
Do	Tuaruane	540	65	"Glosopeda" carried on infected ship.
January 4, 1909	Hongkong	105	—	"Glosopeda."
January 5, 1909	do	157	—	Do.
January 15, 1909	do	238	—	Do.
January 19, 1909	do	113	—	Do.
January 23, 1909	do	90	—	Do.
January 25, 1909	do	85	—	Do.
January 29, 1909	do	85	—	Do.
February 2, 1909	do	139	—	Do.
February 5, 1909	do	56	—	Do.
February 12, 1909	do	178	—	Do.
February 16, 1909	do	158	—	Do.
February 21, 1909	do	288	—	Rinderpest.
February 25, 1909	do	120	—	"Glosopeda."
February 26, 1909	do	170	—	Do.
February 27, 1909	do	51	—	Do.
March 4, 1909	do	93	—	Do.
March 19, 1909	do	142	—	Do.
March 22, 1909	do	175	—	"Glosopeda" and rinder-pest.
March 23, 1909	do	146	—	Do.
March 26, 1909	do	147	—	Rinderpest and "glosopeda."
March 29, 1909	do	118	—	Rinderpest.
April 2, 1909	do	126	—	Do.
April 3, 1909	do	306	—	Do.
April 5, 1909	do	123	—	Do.
Do	do	131	—	Do.
April 11, 1909	do	405	—	Do.
April 12, 1909	do	150	—	Do.
April 16, 1909	do	100	—	Do.
April 20, 1909	do	205	—	Do.
April 27, 1909	do	110	—	"Glosopeda."
April 30, 1909	do	150	—	Do.
May 7, 1909	do	174	—	Rinderpest.
May 9, 1909	do	425	—	"Glosopeda."
May 11, 1909	do	100	—	Do.
May 13, 1909	do	100	—	Do.
May 14, 1909	do	100	—	Do.
May 18, 1909	do	12	—	Rinderpest.
May 20, 1909	do	399	—	Do.
May 21, 1909	do	50	—	Rinderpest and "glosopeda."
May 24, 1909	do	50	—	"Glosopeda."
May 25, 1909	do	50	—	Do.
June 1, 1909	do	50	—	Do.

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Cattle and carabaos arriving in Manila from foreign ports, etc.—Continued.

Date of arrival.	Port of embarkation.	Number of animals.		Disease.
		Cattle.	Carabaos.	
June 7, 1909	Hongkong	100		"Glosopeda."
June 8, 1909	do	103		"Do."
June 11, 1909	do	200		"Glosopeda" and rinderpest.
June 12, 1909	do	210		Rinderpest.
June 14, 1909	do	139		"Do."
June 15, 1909	do	137		Rinderpest and "glosopeda."
June 19, 1909	do	152		"Do."
June 21, 1909	do	113		"Glosopeda," Exposed "glosopeda."
June 22, 1909	do	87		"Do."
June 26, 1909	do	164		"Glosopeda."
June 28, 1909	do	116		Exposed "glosopeda."
June 29, 1909	do	141		"Do."
Total		11,073	79	

EXHIBIT I.

Tabular statement of inspection of the port and city of Manila, ending June 30, 1909.

Kind of animals.	Inspected.		Rate per head.	Amount.	Shipped to provinces.
	From foreign ports.	From Philippine ports.			
Cattle	36,298	2,165	39	₱ 0.20	₱ 7,684.80
Carabaos	3,136	1,421	1	.40	1,822.40
Horses	1,548	1,565	1,065	1.00	2,048.00
Hogs	56	54,542	3	.10	5,459.50
Sheep	3	151		.20	30.80
Goats	4	733	17	.20	144.00
Other animals	262	495	175	.40	232.80
Total	41,162	61,217	1,300	—	13,843

EXHIBIT J.

Inspection and condemnation at abattoir.

Kind of animals.	Inspected.		Condemned.		Rejected.	Parts condemned.
	Ante-mortem.	Post-mortem.	Ante-mortem.	Post-mortem.		
Cattle	31,180	28,379	101	4	144	29,789
Hogs	61,701	60,789	15	910	5	58,892
Sheep	16	16				14
Goats	1,040	16				1,168
Deer	1	1				1
Total	93,939	90,225	117	914	149	86,364

PERIODICALS IN THE LIBRARY OF THE BUREAU OF AGRICULTURE.

Everyone interested in the study of tropical agriculture is invited to visit the library and make use of these periodicals.

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Journal of the College of Agriculture, Tokyo, Japan.

Hawaiian Forester and Agriculturist, Honolulu, Territory of Hawaii.

Tropical Agriculturist, Colombo, Ceylon.

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Bulletin of Agricultural Information, Trinidad.

Journal of the Board of Agriculture of British Guiana, Georgetown.

California Cultivator, Los Angeles, California.

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Farmer and Fruit Grower, Jacksonville, Florida.

Louisiana Planter, New Orleans, Louisiana.

Southern Cultivator, Atlanta, Georgia.

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JANUARY, 1910.

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D. C.
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Philippine Journal of Science, Manila, P. I.
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SPANISH.

Boletin de la Cámara de Comercio Filipina, Manila, P. I.
Revista Agrícola é Industrial, Manila.
Boletin Oficial de la Secretaría de Agricultura, Comercio y Trabajo, Cuba.
Boletin de Agricultura, San José, Costa Rica.
Haciendado Mexicano, El, Mexico, Mexico.
Hacienda, La, Buffalo, New York.
Industrias Americanas, New York, N. Y.
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Agricultor Peruano, El, Lima, Peru.
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Resumen de Agricultura, Barcelona, Spain.

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Bulletin de la Chambre de Commerce de Saigon, Saigon, Indo-China.
Bulletin Economique, Hanoi-Haiphong, Indo-China.
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L'Agronomie Tropicale, Brussels, Belgium.
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Boletim do Museu Goeldi, Para, Brazil.
O Fazendeiro, Sao Paolo, Brazil.
Boletim de Sociedade de Geographia de Lisboa, Portugal.

THE PUBLICATIONS OF THE BUREAU OF AGRICULTURE.

The following-named bulletins of the Bureau of Agriculture are available for distribution, and will be sent free of charge to any address upon application. Applicants are requested to state whether all publications of the Bureau are desired as issued, or only those specified. The name and address of the applicant should be plainly written and all communications should be addressed to the Director of Agriculture, Manila, Philippine Islands.

FARMERS' BULLETINS.

- No. 4. Preliminary Report on Commercial Fibers of the Philippines.
(Spanish.)
- No. 6. Experimental Work with Fungous Diseases of Grasshoppers.
(Spanish.)
- No. 9. A few Suggestions on the Cultivation of Cotton. (Spanish.)
- No. 11. The Jute Industry. (Spanish.)
- No. 12. Abacá. (Manila Hemp.) (English.)
- No. 13. The Cultivation of Maguey in the Philippine Islands. (English and Spanish.)
- No. 14. The Cultivation of Sesamum in the Philippine Islands. (Spanish.)
- No. 15. Tobacco Growing in the Philippines. (Spanish.)

PRESS BULLETINS.

- No. 6. The Tamarind. (English.)
- No. 8. Maguey; Propagating Abacá from Seed; etc. (English.)
- No. 9. Agricultural Districts; Control of Rinderpest; etc. (English.)
- No. 11. Seed Distribution; Need of Diversified Farming; etc. (English and Spanish.)

POPULAR BULLETINS.

- No. 1. Maguey. (English, Spanish, Visayan, Cebuano.)
- No. 2. Kapok. (English, Spanish, Tagalog, Visayan, Ilocano, Cebuano.)





HIS EXCELLENCY, OUR GOVERNOR-GENERAL, WILLIAM CAMERON FORBES.

THE PHILIPPINE

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No. 2

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EDITORIAL.

PROGRESS THE WATCHWORD.

In this number of the REVIEW we are glad to record so many events which mark the beginning of a new era in the Philippines—the success of the efforts of the Insular Government in the Islands.

In the first place we desire to call attention to the inaugural address of Governor-General William Cameron Forbes, extracts from which will be found on the following pages. In this address the Governor-General speaks in very plain terms of the purpose of the United States Government in these Islands, of the needs of the people and the country—the protection of their health, education, highways, rivers and harbors, railroads, the ownership of land, irrigation works, post-offices, post-roads, telegraphs, and the general prosperity of the country—in a manner that should inspire the confidence of Filipinos and Americans alike. There is no uncertain statement or uncertain tone in any part of this address.

In outlining the future progress of the country we see the Government has made regulations providing for the free admission into the United States of Philippine products under the provisions of the new tariff law; the selection of a prominent veterinarian in the United States as chief veterinarian of the Bureau of Agriculture for the purpose of stamping out the infectious animal diseases in the Islands which have been the greatest obstacle to the actual progress of the country; the executive order regarding labor contracts for the protection of the farmer and employer providing a penalty for the breach of a labor contract; and in the provinces we see the plan of the provincial board of Leyte for fighting the locust and grasshopper pest. The reader will see that the Government has not forgotten to give preference to the small farmers, growers, and producers in order to secure for the poorest man the largest opportunity and the greatest profits possible. All of these movements are for the assistance and protection of the interests of those engaged in various business enterprises and in the development of the natural resources of the country.

On the other hand, in the actual growth and progress of the country we see the tobacco bounties which have been awarded by the Government to the growers in the leading tobacco districts of the Islands to stimulate the growing of a better quality and a larger quantity of tobacco leaf on a given area of land; the purchase by the Havemeyer Company of the San

José friar land estate, which will be turned into a model sugar plantation where sugar growing and possibly sugar refining will be carried on in the most up-to-date manner that is known to the sugar manufacturers of the world; the annual report of the treasurer of the Moro Province which marks steady and substantial progress in the second largest island in the Archipelago; the Philippine Carnival has been more than ever before an industrial exhibition which represents the possibilities of the industries, manufactures, and trade of the country.

In consequence of such progress in the Islands we see the agents of the other countries such as Hawaii, Japan, China, Java, and Australia visiting the Philippines to investigate our conditions and to look after their share of the growing trade of this country; we see the great trans-Pacific steamship companies arranging to make Manila a port of call for their steamers to the Far East. In addition to these movements we see the organization in the United States and the Philippines, as a consequence of the opening of the United States market to the products of the Philippines, of a large and strong company to look after and guard the interests of the producers of Philippine products under a just and fair competition with the products of the United States that the people of the Philippine Islands may enjoy the largest possible benefits of the open market for their products in the United States. Finally we invite the attention of our readers to the recommendations of the Philippine Commission to the Secretary of War which if approved, will, we believe, give to everyone, Filipinos, Americans, and all engaged in legitimate business, as large opportunities as there are in any State or country in the world for business success, for the building up of large business enterprises, and the making for themselves independent fortunes equal to those of the citizens of any country in the world—*the new era.*

EXTRACTS FROM THE INAUGURAL ADDRESS OF GOVERNOR-GENERAL WILLIAM CAMERON FORBES.

OUR PURPOSE.

Analyzing the instructions of President McKinley, we may fairly take as the goal toward which we are to steer, the happiness, peace, and prosperity of the Philippine people. In so far as the people are to-day happy, peaceful, and prosperous we have succeeded; in so far as the people do not enjoy these blessings, we have not yet achieved success. The people are to-day peaceful. We can concentrate our attention in bringing them prosperity, secure in the belief that under just and equitable laws, under a wise and firm government, with that freedom of thought, of speech, of worship, of labor, and of opportunity which now prevail, happiness will not be found far away when the means of procuring it are abundantly at hand.

Here is a climate particularly favorable for some classes of products and capable of yielding vast returns to honest and intelligent expenditure of effort, and yet here we have a people bemoaning their poverty and living from day to day without those reserve supplies so necessary where crops are uncertain, without the alleviation from suffering which modern medicines and surgery can give, without the nourishing kinds of food so necessary to build up the strength of the body, without houses built to withstand the elements, without, in fact, most of those things which modern civilization believes to be necessary for the happiness of a community.

An analysis of the fundamental conditions of life reveals in part the reasons for these conditions. A very large proportion of the people have been held in that primitive condition where each man supplied all of the things necessary for his own use and got along with only what he could personally produce. *We must bend our efforts to advance the day when each individual supplies the articles which he is best fitted to produce, which he sells to his fellow-men, and uses the money thus gained to*

purchase of others the things which they can produce better and cheaper than he. This is the essence of trade, and this condition of affairs is impossible without economical and adequate means of transportation, hitherto woefully lacking.

CAPITAL NEEDED.

Our success in accomplishing our principal object in these Islands, namely, that of bettering the condition of the people, may be best measured by the increase from time to time in the rate of wages and in the value of imports and exports.

Let us turn our attention to a few comparative figures. The total population of Hawaii is 198,000 people, or about one-fortieth part of the population of the Philippine Islands, now approximately eight millions. The total exports from Hawaii in 1907 were \$29,000,000, the total exports from the Philippine Islands for the same year were \$34,000,000. In other words, Hawaii produced for export approximately thirty-six times as much per capita as did the Philippine Islands. This is not because their laborers are superior, as Hawaii has come here in search of laborers and reports that those few whom they have obtained are equal to their Japanese, Korean, and other laborers.

Porto Rico has 1,000,000 people, or one-eighth the population of the Philippine Islands, and in 1907 its exports were \$27,000,000. Porto Rico evidently does not exercise the same degree of economy in the use of its labor as does Hawaii, for it produces only one-sixth as much per capita for export, and still Porto Rico exports six times as much per capita as do the people of the Philippine Islands. Were these Islands to produce for sale to other countries as much per capita as Porto Rico the total exports would be \$216,000,000. Were they to produce as much per capita as Hawaii the total exports would be \$1,179,000,000 a year.

The explanation of this lies in the fact that Hawaii has an abundance of capital, employs modern methods of cultivation and manufacture, modern freight-handling devices, and suitable and adequate steamship and railroad facilities. In other words, in Hawaii the work of the laborer counts, in the Philippine Islands it does not. No, it is not labor that is wanted here, it is capital. Many Filipinos have a tendency to oppose the introduction of capital into these Islands, either from the United States or from foreign countries, fearing lest somehow it should militate against the realization of their aspirations. In my judgment it will have the opposite effect. It is true that it

might be possible in the course of several generations to develop the latent resources of the Philippine Islands without the assistance of outside capital and finally to accumulate enough to develop the domestic business from within. But why wait? We had better attract for our use the accumulations of wealth already made in other countries, sure that the advantages which flow from them will far more than offset any possible disadvantage due to the fact that some of the profits will leave the country or that the owners of the capital will endeavor to influence the administration of the Islands or their political status.

Capital demands a stable government. Capital is not particularly interested in the color or design of the flag. It wants just and equitable laws, sound and uniform policy on the part of the government, just and fair treatment in the courts. The faith of the United States is pledged that all of these benefits shall be permanently assured to the Filipinos. No capitalist need feel alarmed as to the security of his investment provided it has been made in such a way as to fulfill the conditions imposed by law. The United States stands pledged to the establishment and maintenance of a stable government in the Philippine Islands, not for the sake of such capital as may be invested here only, but for the sake of the welfare of the Philippine people and of the good faith of the United States before the world. The security of foreign capital is merely an incident in the general security of property and other rights to the Filipino, and both are now permanently assured. It would be good general policy for us to offer every reasonable inducement to capital to come, and with that end in view, to liberalize our land and mining laws and lessen the restrictions which have hitherto tended to discourage investors. My policy will be to hold out the hand of welcome to all people desiring to engage in legitimate enterprise.

The passage of the Payne Bill should give a new lease of life to the Philippine Islands. It assures us of the best market in the world for our products, a market that is not open to our neighbors, and therefore gives the Philippine Islands a preference which should enable us to increase very greatly the production of certain of our staples. This will have a vivifying effect which will be felt throughout the length and breadth of these Islands and awaken new hope in the hearts of the people who have been struggling against almost overwhelming difficulties.

MEANS OF TRANSPORTATION.

Railroads.—It is part of our programme to push to early completion a general and systematic improvement of the means of transportation. The existing contracts for railroads aggregate nearly a thousand miles, of which half are now built. This in itself is earnest of the beginning of the new era and will provide adequate transportation for a large proportion of the people.

Rivers and harbors.—The Government should bend its efforts toward the development of the rivers and harbors—a potential means of transportation which should equal in importance the facilities supplied by the railroads. We have more than a hundred rivers navigable within but closed at the mouth to the entrance of seagoing vessels by reason of the bars formed by the action of the waves at the shore. Especial attention should be given to the dredging of these bars and the building of bulk-heads and scourways to render these natural highways available for the use and development of the Islands, and the Government should not rest until both sides of every one of these navigable rivers are lined from end to end with farms occupied and worked by prosperous and happy people.

Highways.—More important still, and supplementary to all of these, are the roads, and in the present progress of the work in connection with roads, I find the most happy augury for the future success of the Philippine people. In December, 1907, the Commission, until then the sole legislative body of the Islands, adjourned without passing any law making adequate provision for the necessary construction and annual maintenance of roads. I am glad to credit the members of the Assembly with having taken the most advanced and enlightened interest in the work and having made the most liberal provision for roads by voting funds for that purpose to the limit of the capacity of the treasury. Before the Legislature had convened the Commission had passed a law making a majority of the provincial boards elective, a measure which provided for the extension of autonomy to the provinces in line with the instructions of Presidents McKinley and Roosevelt and the policy of the American Government here. The success of the road movement depended upon getting the provincial board to pass a law each year increasing the amount of the cedula or poll tax from ₱1 to ₱2. To do this it is necessary to convince the provincial officials each year of the necessity of road construction and maintenance for their own present development and future

welfare. How nobly these officers have responded is demonstrated by the fact that the first year 27 of the 31, the second year 30, and the third year 31, or all of the provinces affected, have adopted the double cedula tax and put themselves in the line of advancement.

PUBLIC HEALTH.

The Filipinos are not strong enough to do the work which is required of able-bodied people. Examinations made by the sanitary authorities reveal the fact that in the regions inspected, which may be taken as fairly representative, by far the greater majority of the people are afflicted with more than one form of intestinal parasite, which sap the vitality and lessen the power to do work and the power of resisting disease. The most fruitful sources of these parasites are the polluted surface waters which the people have been accustomed to drink. A supply of pure potable water is the first requisite for the purpose of sanitation. To this end the most important agency is that of the artesian wells, which should be bored in every municipality and barrio in the Islands. Fortunately, the people themselves are most keenly alive to this necessity, and there has been no difficulty in getting a vote of the Philippine representatives of the different entities of government—Insular, provincial, and municipal—in favor of this most vital and important work.

Another direction in which the energy of the Government can be profitably employed is in checking the infant mortality, which continues at a most alarming rate. Care of infants will result in an increase in the numbers of the population and in the physique of the children, which can not fail to be most beneficial to the Islands.

OWNERSHIP OF LAND.

There is no agency more potent in creating good citizenship than is the ownership of land. It is necessary that the owners of land should be provided with registered titles, to use as security for loans or that they may be able to sell without there being the probability that the purchaser has acquired only a lawsuit. It is my purpose to provide for a complete survey of all the parcels of land in each municipality. I should like to so arrange matters that a judge of the Court of Land Registration may be at hand to fix the ownership to each parcel as surveyed, and when fixed the Government will give title to the land on the basis of division of expense of the same, the owner repaying somewhere from 60 to 80 per cent of the cost, in easy installments. This will save much of the traveling of surveyors

and greatly reduce the cost. The Agricultural Bank and Postal Savings Bank will then be able to make advantageous loans and greatly assist agriculture.

It is my intention to make the appointments to the vacant authorized positions in the Court of Land Registration in the near future.

The Government will adopt the policy of not entering objections to the issue of titles to land to its occupants where it is clear that the interest of the public will not suffer. I believe that these measures will end the present stagnant condition in the matter of land registration.

IRRIGATION WORK.

In the matter of irrigation, it is the plan of the Government to continue the active work of surveys and the gathering of data until we have a complete irrigation survey of the Islands and know each area capable of irrigation, the flow of each river, even at the driest times, the works necessary for its control in time of floods, the cost of the intended irrigation works, and the cost per hectare of putting water on the land to be improved. Having due regard to distributing the benefits from the irrigation works so as not to concentrate them all in one province or island, it is the policy of the Government to develop those areas first where the cost of the construction of the system per hectare is least. It is expected to collect from the land benefited the cost of maintenance of the system, the interest on the money invested, and something besides, which is to be added to the original fund, and which, with the continuing annual appropriation of ₱750,000 voted by the Legislature, should roll up into a sum which will, in the course of time, supply the Islands with irrigation systems wherever it can be done with profit.

POST-OFFICES, POST-ROADS, AND TELEGRAPHS.

The establishment of post-offices and extension of the rural delivery of letters should be continued as fast as funds will permit, until at least every municipality has its post-office.

It is hoped to establish and maintain wire or wireless telegraphic communication with every provincial capital, and to extend the system of telephone connection between the municipalities throughout the provinces. The general dissemination of knowledge as to prices, movements of ships, availability of cargo, and so forth, is of the greatest importance in stimulating production.

EDUCATION.

I want to see emphasis laid upon the importance of the practical side of industrial and agricultural education. Success in agriculture and industry are the things sought, and they can be best taught, and one might say only taught, by those who have themselves achieved success. Our agricultural schools should be made self-supporting, so that their products should pay the cost of the labor which is done on them, and something more.

I should like to see every one of the two million children of school age in these Islands receiving an education. The thought is grievous that any boy or girl in the Philippine Islands wanting to get an education should be unable to do so because of failure of the Government to provide facilities, and yet the resources of the Islands have not developed to a point where I feel that we are justified in largely increasing the appropriation for education. When the time comes that facilities can be available, I shall not be opposed to a law providing for compulsory education. The amount of education we shall be able to accomplish in ten years will be very much greater if we devote our first money toward increasing the wealth of the people and later use the resulting increase of revenue for extending our educational facilities. I liken the work of the Government on irrigation and improvement of transportation to cutting the strings which close the mouth of a purse of gold. The gold will pour forth and yield enough for all.

It is my hope that the Philippines University will soon establish, among other technical schools, a school of engineering, so that the important work of building up the public works of these Islands may be placed gradually in the hands of Filipinos.

The Filipino is as quick as any person to indulge in desirable and health-giving forms of amusement. Nothing could be better for the Filipino than stimulating his interest in wholesome outdoor sports, to develop the body and divert the mind. In the large cities of the United States it is a well-known fact that crime decreases in the neighborhood of playgrounds for children, and I hope the time is not far distant when every city in the Philippine Islands will maintain a plaza where children and young men and women can indulge themselves in healthy outdoor recreation. A strong body is earnest of a mind ready to work and to endure, and the young men and women of the Philippine Islands should make it a matter of pride to have broad and deep chests, finely developed muscles, and hands inured to toil.

FINANCIAL PROSPERITY.

Financially the condition of the Insular Treasury has been most satisfactory. We have had a reasonable surplus and rate of expenditure for current expense which has left a comfortable margin, some of which has been available each year for the construction of public works out of the current revenues. Although many people have got into the habit of complaining that the rate of taxation is high, and there has been a good deal of political agitation in favor of lower taxes, a study of comparative figures reveals the fact that the rate of taxation in the Philippine Islands, compared with that of other countries similarly situated, is extremely low, and the Filipino who questions the ability of his people to pay the low rate of taxation now imposed shows a great lack of confidence in their capacity.

The rinderpest is now the greatest menace to material development. The draft animals must be saved to the farmer, otherwise he can neither cultivate the land nor haul his products to market. The method of immunization is now known. The control of this disease is now a question of money and organization and I have already taken measures to remedy the deficiencies that have existed and shall allow no stone to remain unturned until this effort is crowned with success.

The destruction caused by locusts can be greatly lessened in my judgment by a system of rewards to be given for information brought of the places where the eggs are laid and, under provision of existing law, turning out the populace to destroy these or the young locusts before they have reached the age when they can fly.

The arm of the Government will be strongly used to reach out and find and punish those captains of steamers who refuse to carry a consignment of goods so that they may buy it at less than its value. The hand of the Government will be heavily laid on those officials, Insular, provincial, or municipal, who use their positions to compel anyone to sell his products at a price that he knows to be so low as to be unfair.

CONCLUSION.

To the Filipinos I say, turn your undivided attention to the material development of your country and rest confident in the good faith of the United States. If it were the desire of the United States to prevent the Filipinos from becoming a progressive, happy, and united people, strong in the accumulations of wealth and knowledge and capable of nationality, we should not be devoting our entire energies toward the accomplishment

of those measures which make such a nationality possible; we should not be providing all of the people of the Islands with a common language; we should not be maintaining different organizations of armed Filipinos drilled in the art of war, aggregating 10,000 men, of whom 5,000 are paid from the Treasury of the United States as United States troops; we should not be extending the privileges of occupying the more important posts in the Government service to Filipinos; we should not be devoting our first efforts toward binding the Filipinos together into a closer union by those ties which come from improved means of communication, as post-offices, telegraphs and telephones, railroads, roads, subsidized steamboats, and so forth.

I regret to have to say that in my judgment in some instances the Filipinos themselves have hindered the fruition of these efforts, as for example by discouraging the universal adoption of a common language, by endeavoring to avert the opening of the markets of the United States to Philippine products, and by discouraging the coming of capital, thus impeding and delaying the arrival of that time when a national existence will be possible.

The success of an administration varies directly with the degree of confidence and assistance given by the people themselves. The desire and ability to assist the Government is characteristic of successful democratic forms of government and I invite the Filipino people to bring to me their recommendations and suggestions of measures for the betterment of their condition with the certainty that I shall always be ready to receive them with sympathetic attention.

To the Americans I say, those of you who wish to see the fullest measure of American success in these Islands should deal courteously with the Filipino. Speak him fair; deal with him fairly, and look after his interests as though they were yours, as indeed they are. To those who are engaged in business I add, do not feel it necessary to make a big profit on each transaction. It is not important that each transaction should be profitable to you; it is important that each transaction should be creditable to you. The great axiom of modern business is that a trade to be a good trade must be a good trade for both parties. A man to really succeed in business must have his clients and customers satisfied. Safe profits are made by economies in operation, in transportation, in methods of production and manufacture and not by charging high prices. See that your customer gets his full money's worth and that the goods which he receives of you are as represented. Those who do

otherwise are enemies to the successful administration of the Islands. It is not that I object to large profits—on the contrary, I should like to see all the merchants here accumulating wealth—but that I believe the methods I have suggested will result in a greater volume of business that will in the long run yield larger and safer returns.

To all of you I say: Have confidence, turn your attention to those occupations which are fitting to people in time of profound peace. There is not on the horizon discernible any cloud which indicates the possibility of any kind of disturbance in the present status of these Islands, either from within or from without, by insurrection or war.

The United States is strong, determined, fixed in her policy, and not to be dissuaded or coerced. The development of the Philippine Islands will proceed along the lines originally set forth, strictly adhered to by each successive administration and by gradual processes in line of declared policy, not by spasms or jerks.

There seems to be in some quarters a fear that with the new administration there is an intended change of régime; that somehow or other the people will be made to suffer by the exercise of something which they designate as "the strong hand." I hope that my hand will prove to be strong in justice, in maintaining law and order, in helping the weak and distressed, in combating the forces of evil. No people want a weak or feeble government. The only persons who need fear the exercise of a strong hand are those who fear justice, or those who for reasons of their own may be planning evil. The man who is loyal to himself, loyal to the people, and loyal to his oath of allegiance to the United States, need have no anxiety. I think that the character and history of the present President of the United States is a guaranty that no man will be allowed to remain a Governor of these Islands who uses his power in an unjust cause or to the disadvantage of the rights of the Filipinos as guaranteed them by the liberal provisions of Congress.

In friendliness, in coöperation, there is strength; in recrimination, in hostility, there is weakness. Let us all reach out the hand of friendship to our neighbor and endeavor to promote an era of good feeling, of ample confidence, of mutual respect, and of coöperation that we may all secure the realization of the main object to the attainment of which all the energies of this administration are hereby pledged; namely, the material prosperity of the Philippine Islands.

THE SALE OF THE SAN JOSE FRIAR LAND ESTATE.

Early in December one of the largest sales of public lands which has ever been consummated in the Philippine Islands was made to Mr. E. L. Poole, who was formerly engaged in the sugar business in Cuba and later in the Hawaiian Islands, from which place he comes to the Philippines. This estate, which is situated on the southwest coast toward the southern end of the Island of Mindoro, contains over 22,400 hectares, or about 55,000 acres. It has a sea frontage of about 13 miles, and the harbor, which is on Mangarin Bay, is about 4 miles from the southern boundary of the estate. Beginning at sea level the land rises gently toward the mountains. Two large rivers pass through the estate, but there are a number of smaller streams. The larger part of the land is virgin soil and a considerable portion of it is covered with good timber, including the best molave, ipil, and lower grades. The estate is practically uninhabited save by a few Mangyans who belong to the wild tribes.

Soundings for a wharf at Pandarochan Point near the barrio of Mangarin have been made and the materials for the construction have been ordered. The survey for the railroad—about 20 miles—which will run from this wharf through the estate is in progress. Seed cane has been ordered and buildings for homes of employees, for a hospital, and for other purposes are being erected.

The sale of this land was made under the Friar Lands Act (No. 1120) of the Philippine Commission, and became effective January 4, 1910. Under the terms of the sale Mr. Poole made the first payment to the Philippine Government on that date. The balance of the purchase price is to be paid in equal annual installments until the whole amount, ₱734,000, has been paid. These annual installments will bear interest at the rate of 4 per cent per annum. It is understood that this estate together with some lands adjoining will be converted into an immense sugar plantation under the management of Mr. Poole, the operating firm being The Mindoro Development Company, which has been erroneously mentioned as the Havemeyer Company. The San José estate is 165 miles from Manila, 168 miles from Iloilo, and 265 miles from Cebu.

This step on the part of the Insular Government which follows so closely in line with the policy laid down by the Governor-General in his inaugural address, in regard to securing the investment of capital for the development of Philippine resources, should have a decided significance for every Filipino interested in the agricultural, mining, and other resources of his country. While it is the policy of the Insular Government and the determination of the United States to give the Filipinos the first opportunity to develop the resources of their country, it is very evidently not the intention of the United States Government or the Insular authorities to allow these resources to lie idle and undeveloped. In case the Filipinos themselves fail to improve the opportunities given to them to develop the resources of their country and to reap the large profits to be gained therefrom, the entrance of capital and business men from other countries seems inevitable.

THE BOUNTIES FOR THE TOBACCO GROWERS OF
UNION, CAGAYAN, AND ISABELA.

UNION.

For the production of the greatest number of kilos of marketable leaves per hectare:

First district.

Name.	Place.	Prize.	Amount.
Vicente Dumo -----	Naguillian -----	First-----	P 121.87
Adriano Milanes -----	Tubao -----	Second-----	73.12
Teodoro Doctolero -----	do -----	Third-----	48.75

Second district.

Juan Bulagot -----	Bauang -----	First-----	P 121.87
Silverio Dumpit -----	do -----	Second-----	73.12
Agustin Dumo -----	do -----	Third-----	48.75

Third district.

(No data submitted hence no awards made.)

For sorting the tobacco leaves in the most uniform manner as regards size, quality, coloring, etc.:

First district.

Name.	Place.	Prize.	Amount.
Juan Vercelles -----	Tubao -----	First-----	P 121.87
Liberato Tejano -----	Naguillian -----	Second-----	73.12
Matias Ventura -----	Tubao -----	Third-----	48.75

Second district.

Estanislao Madrid -----	Bauang -----	First-----	P 121.87
Juan Balagot -----	do -----	Second-----	73.12
Aniceto Barnachea -----	do -----	Third-----	48.75

Third district.

Leocadio Ostrea -----	Balaon -----	First-----	P 121.87
Cipriano Obra -----	do -----	Second-----	73.12
Elpidio Peralta -----	do -----	Third-----	48.75

CAGAYAN.

For the production of the greatest number of kilos of marketable leaves per hectare:

First district.

Name.	Place.	Prize.	Amount.
Domingo Banataao	Iguig	First	₱162.50
Andres Pamitan	do	Second	97.50
Quirico Reboredo	do	Third	65.00

Second district.

W. M. Hawkins	Piat	First	₱162.50
Jacobo Soriano	Tuao	Second	97.50
Luis Serrano	Piat	Third	65.00

Third district.¹

Moises Adviento	Alcala	First	₱162.50
Fulgencio Pedralves	Baggao	Second	97.50

¹ Only two competitors in this district.

For sorting the tobacco leaves in the most uniform manner as regards size, quality, coloring, etc.:

First district.

Name.	Place.	Prize.	Amount.
Mariano Mallo	Iguig	First	₱162.50
Miguel Mastrag	do	Second	97.50
Quirico Roboredo	do	Third	65.00

Second district.

Gonzalo Malana	Piat	First	₱162.50
Luis Serrano	do	Second	97.50
Eladio Lejos	do	Third	65.00

Third district.¹

Moises Adviento	Alcala	First	₱162.50
Fulgencio Pedralves	Baggao	Second	97.50

¹ Only two competitors in this district.

PHILIPPINE AGRICULTURAL REVIEW.

ISABELA.¹

For the production of the greatest number of kilos of marketable leaves per hectare:

First district.

Name.	Place.	Prize	Amount.
Pedro Gammad	Echague	First	P 216.66
Antonia Bacay	do	Second	130.00

Second district.

Vicenta Monteagudo	Naguilian	First	P 216.66
Norberto Cañilan	Gamu	Second	130.00
Mariano Marques	do	Third	86.66

Third district.

Josefa Battung	Tumauini	First	P 216.66
Antonio Baggao	Ilagan	Second	130.00
Jacinto Maddauin	Tumauini	Third	86.66

For sorting the tobacco leaves in the most uniform manner as regards size, quality, coloring, etc.:

First district.¹

Name.	Place.	Prize	Amount.
Pedro Gammad	Echague	First	P 216.66
Antonia Bacay	do	Second	130.00

¹ Only two competitors in this district.

Second district.

Vicenta Monteagudo	Naguilian	First	P 216.66
José Lizardo	Gamu	Second	130.00
Melchor Ramos	do	Third	86.66

Third district.

Antonio Baggao	Ilagan	First	P 216.66
Joséfa Battung	Tumauini	Second	130.00
Leon Etchore	do	Third	86.66

¹ Only two competitors in this district.

REGULATIONS GOVERNING THE FREE ADMISSION INTO THE UNITED STATES OF PHILIPPINE SUGAR, TOBACCO, AND CIGARS.

EXECUTIVE ORDER NO. 109, 1909.

Whereas coöperative action on the part of the Philippine Government appears desirable for the proper and practical enforcement of those provisions of section five of the United States tariff act of August fifth, nineteen hundred and nine, relating to the limitations and qualifications placed upon the free admission into the United States of Philippine sugar, tobacco, and cigars, the following regulations are, by arrangement between the honorable the Secretary of the Treasury and the honorable the Secretary of War of the United States, promulgated for the information and guidance of all concerned:

PARAGRAPH 1. *All producers of sugar desiring to avail themselves of the privileges of free entry of sugar into the United States, either directly or indirectly, shall file with the Collector of Internal Revenue, in such form and manner as said Collector shall prescribe, written applications therefor before the opening of the shipping season and not later than the first day of November in each year.* Each such application shall contain a statement under oath of the applicant, setting forth the quantity of sugar produced, or proposed to be produced, by such applicant during the fiscal year in which the application is made, the place and manner of production, the area of land employed, or to be employed, by such applicant, if any, its location, the quantity of sugar for which the applicant desires free entry and will ship, or intends to ship, or sell for shipment to the United States, that said sugar has been or will be actually produced by said applicant and such other data as may, from time to time, be required by the Collector of Internal Revenue.

PAR. 2. The term "producers of sugar" as used in section five of the United States Tariff Act of August fifth, nineteen hundred and nine, and for the purpose of these regulations, shall be taken to mean individuals, firms, or corporations who actually produce, or procure the production, from materials owned

by them, of sugar, in its first marketable form, as such, and are owners thereof when it reaches that stage of advancement.

PAR. 3. The Collector of Internal Revenue shall establish registers and record therein all applications filed in pursuance of paragraph one hereof, and all changes of ownership of each lot of sugar covered thereby concerning which satisfactory evidence of such changes of ownership is produced to him. He shall investigate all statements of applicants and others involved in such manner as may be necessary to prevent any infraction of the law or fraudulent practice with reference thereto. Not later than November twentieth of each year the Collector of Internal Revenue shall transmit to the Insular Collector of Customs complete transcripts of the registers herein prescribed with full information pertaining to each entry therein, showing the owners of record at the date of transmittal, and so arranged as to show in one group the producers, or intending producers, of less than five hundred tons of sugar, and in another group, in progressive order, by quantities, those who have produced, or intend to produce, five hundred tons or more, within the fiscal year for which their application for free admission into the United States is filed. Thereafter he shall promptly inform the Insular Collector of Customs of all changes in ownership of which he may be satisfactorily advised. The Collector of Internal Revenue shall also furnish the Insular Collector of Customs, upon request and as required by the latter, with all information in his possession or that may be acquired by his Bureau, which will enable the latter to determine the correctness or incorrectness of "exporters'" (shippers') statements in connection with the certificates of origin required by United States Treasury Department Circular Numbered Thirty-seven, series of nineteen hundred and nine.

PAR. 4. The Insular Collector of Customs is hereby charged with the duty of causing to be issued at the various ports of entry in the Philippine Islands, under proper regulations, in strict accordance with the facts and the terms and spirit of section five of the United States Tariff Act of August fifth, nineteen hundred and nine, and United States Treasury Department Circular Numbered Thirty-seven, series of nineteen hundred and nine, the certificates of origin prescribed in said circular. He will take the necessary measures to prevent the issuance of such certificates of origin in any fiscal year covering sugar, cigars, or tobacco in excess of the quantities of those commodities entitled to free entry into the United States in any fiscal year under the provisions of section five of the United

States Tariff Act of August fifth, nineteen hundred and nine. The Insular Collector of Customs shall cause certificates of origin covering sugar shipped to the United States to be issued in such manner as to give full effect to the provisions of section five of the United States Tariff Act of August fifth, nineteen hundred and nine, requiring that "*preference in the right of free entry of sugar to be imported into the United States from the Philippine Islands * * ** shall be given, first to producers of less than five hundred gross tons in any fiscal year, then to producers of the lowest output in excess of five hundred gross tons in any fiscal year," using as a basis for the arrangement of the issuance of such certificates the registers furnished him by the Collector of Internal Revenue as required in paragraph three hereof: *Provided, however,* That customs officers issuing such certificates shall themselves individually use every precaution to prevent perversion of the provisions of the law herein quoted. The Insular Collector of Customs shall not issue or permit to be issued any certificate of origin until he or such issuing officer shall be personally satisfied from such investigations as may be necessary (1) that the certificates of origin issued by them do not cover merchandise in excess of the limitations prescribed in section five of the United States Tariff Act of August fifth, nineteen hundred and nine; (2) that the statements of the "exporter" (shipper) are correct and that no part or parcel of the merchandise described therein contains foreign materials to the value of more than twenty per cent of the total value of any completed article described in any such certificates; and (3) with respect to sugar, that the issuance by them of such certificate of origin covering that product will give full effect to the provisions of section five of the United States Tariff Act of August fifth, nineteen hundred and nine, relating to the preference to be given to the smaller producers of sugar in their right to free admission of their product into the United States.

PAR. 5. It is hereby made the duty of all officials of the Philippine Government who are required to perform acts in connection with the carrying into effect of the terms of this order to instruct and advise small producers of sugar of their preferred rights in the premises.

PAR. 6. Copies of ~~this~~ order shall be distributed by the Collector of Internal Revenue to all producers of sugar, and to all cigar and other manufacturers in the Philippine Islands, as well as to all other persons interested or concerned.

LABOR CONTRACTS IN THE PHILIPPINES.

EXECUTIVE ORDER NO. 63, 1909.

All Insular, provincial, and municipal officers are prohibited from employing in any capacity (a) any man known to have broken a contract or agreement for labor with an employer of labor within three years and who remains in debt to such employer for money, transportation, supplies, or valuables advanced, exclusive of interest thereon, or (b) any employer of labor who has broken his contract or agreement with his employees.

All employers of labor are requested to send to the provincial treasurer of their province the name and cedula number of any person who has broken a contract or agreement as above set forth, together with a statement of the circumstances of such violation. The treasurer, after making an investigation sufficient to satisfy himself as to the facts of the case, shall keep a list of such persons and shall forward to the Director of Labor, in Manila, all communications so received from employers of labor.

It shall be the duty of the Director of Labor to compile all such lists and have them printed in circulars or such other manner as may be approved by the Governor-General. It shall also be the duty of the Director of Labor to check over the official roster and pay rolls of the Insular Government, and the duty of the provincial treasurers to check over lists of officers and the pay rolls of the provinces and municipalities, to see that no infraction of this order has taken place, taking especial care that no man guilty of such violation is employed upon any municipal police force.

If any man so disqualified considers himself aggrieved, or believes that his name should not appear on the list, he may appeal to the provincial governor, who shall forward his recommendation to the Director of Labor, who shall decide, after proper investigation, whether the appellant has been wrongfully

listed, and who, subject to such rules and regulations as may be prescribed by the Secretary of Commerce and Police, may order his name removed from the list.

Disqualification for breaking a contract shall last for three years from the date of the breach.

Nothing contained in this order shall prevent the provincial and municipal officials from allowing men who prefer to work out their cedula tax on the roads, or who can not pay the same, to perform the work in lieu of payment.

AN ACT OF THE PROVINCIAL BOARD OF LEYTE TO
PROVIDE FOR FIGHTING THE LOCUST
AND GRASSHOPPER PEST.

ARTICLE 1. Any person who may note the presence of locusts or grasshoppers at any place in the Province of Leyte, is required by law to report the same at once to the *teniente de barrio* of the district where the locusts or grasshoppers may be, and the said *teniente de barrio* will without any delay (a) order that all the able-bodied inhabitants of his barrio with the coöperation of all the *tenientes* and inhabitants of the adjoining barrios be compelled to work for the suppression of the locusts and grasshoppers; (b) report at once to the local authorities of his municipality.

ART. 2. Any local authority knowing of the existence of locusts or grasshoppers within his municipality shall notify the municipal president who (a) will direct all the members of the council of the municipality to coöperate with the inhabitants of their respective districts in the compulsory work for the destruction of locusts or grasshoppers; (b) will report to the provincial governor the existence of locusts or grasshoppers within his municipality and the work done toward suppressing them; (c) to convene the municipal council, when possible, in extraordinary session for the purpose of adopting proper resolutions regarding the suppression of locusts and grasshoppers; and when funds are necessary for the work to vote the amount needed from the municipal funds; provided, that in case the municipality does not have sufficient funds for these expenses, the council must ask help from the province.

ART. 3. The municipal president, and the member of the council for the district where the locusts or grasshoppers have appeared, are bound to go to said place in order to personally direct the work of destruction.

ART. 4. Any person who, by virtue of the preceding articles, shall fail to fulfill his duty, shall be declared guilty of an offense and punished by a fine, not to exceed two hundred pesos Philippine currency, or thirty days imprisonment, at the discretion

of the justice of the peace having jurisdiction to judge the violators of these rules.

ART. 5. The funds accumulating from fines imposed for the violation of these rules shall constitute a special fund which will be deposited in the hands of the municipal council, for the suppression of locusts or grasshoppers.

ART. 6. Six official copies of these regulations will be furnished to each municipal secretary of this province, one for the justice of the peace, the other five to be posted in prominent places in the town. The Director of Agriculture and the judge of the Court of First Instance of the Twelfth Judicial District, Tacloban, Leyte, will also be furnished official copies of this act.

EXTRACTS FROM THE ANNUAL REPORT OF THE TREASURER OF THE MORO PROVINCE.

One of the best signs of steady and healthy progress in the development of the Philippines and the surest guaranty of the energy and effort which is being put forth for the permanent improvement of the country is found in the following extracts from the annual report of the treasurer of the Moro Province for the fiscal year ending June 30, 1909.

Comparative statement of provincial revenues by districts for years 1908 and 1909.

District.	1908	1909	Increase.	Decrease.
Zamboanga	P76,151.20	P85,813.40	P9,662.20	.....
Sulu	31,009.12	34,140.55	3,131.43	.....
Cotabato	15,213.32	1,114.71	3,901.39	.....
Davao	36,599.09	32,660.59	.....	P3,938.50
Lanao	10,440.53	18,903.16	8,462.63	.....

Receipts from the sales of San Ramon farm products for the month of June, 1909, amounting to P2,543.89, were received too late to be included in the above report. The total receipts from this source for the fiscal year were P9,567.55.

Statement showing customs receipts for fiscal years, 1904 to 1909, inclusive.

1904	P222,388.77
1905	263,242.13
1906	318,394.40
1907	370,275.20
1908	362,810.51
1909	363,876.50

The government of the Moro Province is the beneficiary of revenues paid upon all foreign goods entered and cleared at customs ports within the Moro Province. Imports which pay duty at ports of entry within the Moro Province amount to approximately one-third of the total foreign goods consumed therein. The balance, or two-thirds, of all foreign goods so consumed must enter and pay duty at ports outside the Moro Province, but within the Philippine Islands; thus the treasury of the

Moro Province receives but one-third of the customs revenues derived from all foreign goods consumed by its people while the Insular Treasury is the beneficiary of the revenues from the other two-thirds. The revenues thus derived by the Insular Treasury are disbursed for Insular and provincial purposes outside the Moro Province. Taking the past fiscal year as a basis, the result would be as follows:

Customs revenues collected within the Moro Province	₱363,876.50
Customs revenues collected by the Insular Treasury upon foreign goods consumed within the Moro Province	727,753.00
Total	1,091,629.00

The ₱727,753.00 collected by the Insular Treasury is due to the capital and energy expended within the Moro Province, but from which result we only receive ₱363,876.50.

AGRICULTURE.

Development along agricultural lines continued during the fiscal year, and is shown by the increased exports, as follows:

Hemp:	
1908	₱892,667.59
1909	946,631.73
Copra:	
1908	399,260.82
1909	459,051.78

While the above statement of comparisons shows the increased value of hemp exported in 1909 over that of 1908 to be only ₱46,025.86, the actual output in piculs (137.5 pounds) was 43.9 per cent greater in 1909 than in 1908. The number of piculs exported were 73,782.64 in 1909 and 51,267.52 in 1908, so that the increased output for 1909 was 22,515.12 piculs.

The average market price of hemp (Davao and Zamboanga) for the twelve months ending June 30, 1908, was ₱17.41 per picul. The average price for the same product for the twelve months ending June 30, 1909, was ₱12.83 per picul. Had the price per picul during 1908 prevailed during 1909, the money value of the hemp exported from the Moro Province would have been ₱1,284,555.76 instead of ₱946,631.73, a difference of ₱337,924.03.

The highest price paid for first-grade hemp during the twelve months ending June 30, 1908, was ₱23 per picul. The lowest price paid for same grade was ₱17.50. The highest price paid for first grade during same period ending June 30, 1909, was

₱16.50 per picul and the lowest price was ₱12. First-grade Davao hemp brought, during the month of July, 1909, ₱15.75, or an average of ₱13.85 per picul.

Copra exports show an increase during the twelve months ending June 30, 1909, over the corresponding twelve months ending June 30, 1908, amounting to ₱49,790.96. The average price paid for this product during the former period was ₱6.25 per picul, during the latter period ₱6.59. The highest quotation for this product during the past two years was ₱8 per picul in July, 1907. The lowest was ₱4.50 per picul in April and May, 1908. Thereafter it showed a gradually rising market, closing June 30, 1909, at ₱7.50 per picul. In July, 1909, it again reached ₱8 per picul. Thus the market had a downward tendency from July, 1907, until May, 1908, and thereafter a gradually rising market, reaching ₱8 during July, 1909.

The total acreage planted to staple agricultural products during the year exceeded that of the previous year. Of the two principal exports, copra was in the ascendancy by a very large percentage. Hemp shows a falling off, as compared with the previous fiscal year, due to low prices. The acreage planted to crops for local consumption, such as rice and corn, was at least 100 per cent greater than during the previous year.

The lumber industry shows the output for the fiscal year 1909 to be ₱457,583.89, against ₱185,827.63 for the previous fiscal year. The market price of lumber was the same during both years.

THE AGRICULTURAL BANK.

Statement of deposits and withdrawals from January 11 to June 30, 1909.

Total deposits	₱258,847.99	.....
Withdrawals	₱234,028.73	
Balance June 30, 1909	24,819.26	
	258,847.99	258,847.99
Amount of drafts and telegraphic transfers sold during the fiscal year, 1909	467,560.89	
Amount of drafts and telegraphic transfers paid during the same period	23,125.03	

The total amount of deposits made with the bank during the above period was much less than estimated at its opening. This is due to the fact that checks drawn by depositors are negotiable only at this bank.

We understand that the appropriation for the year 1910 provides for the expenditure of ₱54,000 for roads and bridges and ₱64,000 for wharves at Iligan and Zamboanga.

GROWING KAPOK IN JAVA.

[Translated from the Dutch by the Hon. P. K. A. Meerkamp Van Embden,
Consul for the Netherlands.]

SOIL AND CLIMATE.

Kapok comes principally from Java, and the Javanese product is generally considered as the standard. In business kapok is understood to be the cotton around the seed of the kapok tree (*Eriodendron anfractuosum* DC.). This tree grows from sea level up to an altitude of 2,000 feet and even more, but principally in low-lying ground, say below 800 feet above sea level, where the best kapok is produced. Although in higher altitudes the tree gives a certain amount of fruit, the quantity is smaller and the fruit comes later in the year. The product is also of inferior quality because the fruit often is unripe when the rains begin so that it either does not ripen altogether or the cotton gets spoiled by the rain water entering the opened pod.

The best land for the cultivation of kapok is porous, sandy-clay soil near the sea level or a little above it, in a climate with a dry east monsoon. On sandy soil like that in Kediri, Java, the trees also grow very well. Wet east monsoons always have a bad influence, both on the setting of the fruit and on the quality of the cotton.

METHODS OF PROPAGATION.

The kapok tree can be grown either from cuttings or from seed. From cuttings it is very easily grown, as nearly every piece of the tree, even of pretty old ones, will grow when put in the ground, but it is better to propagate it from seeds, if only for the reason that no trees need be destroyed for the purpose.

The seed must be planted at the beginning or about the middle of the west monsoon in seed beds which must be only lightly covered. If the soil is poor it is recommended that some old stable manure be put in about ten days before sowing. Care must be taken that the plants in the seed beds do not stand too close together. The best way is to sow in rows at a distance of

from 25 to 30 centimeters. The distances can vary according to the richness of the soil.

As soon as the young plants are about 10 to 15 centimeters high the covering can be taken away gradually so that some twenty days after sprouting they are exposed to the full sun. This is necessary because kapok requires a great deal of sun and when too much shaded it grows thin and lanky. Soon after taking away the covering is the best time for removing the poorest plants as it can then be seen which plants are the hardiest. No work is necessary on the seed beds except weeding, but if there is a long period of dry weather it is necessary to water the plants or better still to irrigate the soil. About the beginning of the following west monsoon the young trees can be planted out.

Transplanting.—Kapok is often planted along the roads on the coffee and cacao plantations. A distance of from 12 to 15 feet between the trees is usually sufficient. It is recommended to plant the kapok when the plantation is newly opened up. If the plantation is older and already gives shade it will happen very often that the kapok grows lanky and forms into thin trees with few branches.

If kapok is to be the chief product and the whole land is planted therewith, it is recommended to plant not more than 250 trees per *bouw*,¹ as when closer together the trees soon interfere with one another. This is the case when the soil is rich and the land low. If the soil is not so good or if situated at a higher altitude, shorter distances between the trees may be allowed.

Before transplanting it is best to strip off all the leaves and to cut the tree itself down to a height of $1\frac{1}{2}$ or 2 feet, also cut the chief roots so as to make stumps of them. Of such stumps a large percentage will grow. After a year it can not be seen where the cutting has been done. If the tree is not cut short the top will usually die right down to the ground, which of course means that the growth of the new top will be retarded even if the whole tree does not die. It is recommended that holes be made in advance in which to plant the trees. It is necessary to keep the soil thoroughly free from weeds, especially from cogon.

INTERTILLED CROPS.

During the first years one can plant other products between the young trees provided care is taken not to plant too near to them and not to touch the roots. It is best to plant between

¹ Bouw=0.71 hectare=1.75 acres.

the trees such products as require much sun. It must be remembered, however, that the kapok tree during a great part of the east monsoon has no leaves, and that all plants feed on the soil, so that manuring may be necessary.

A plant much used between kapok trees is pepper, grown on the trees, but when the pepper grows well, the lowest branches of the kapok, say, up to the height of the pepper, will die off, for which reason it is recommended not to let the pepper grow too high, but to cut it down after the harvest every year to a certain height. Pepper must not be planted with kapok before the trees are three years old. If nothing is planted between the kapok trees it will be very useful to keep the soil covered with some kind of legume.

THE HARVEST.

Under favorable circumstances the kapok tree begins to produce in the third year. As only a very few regular kapok plantations exist at present, it can not be stated how large the production will be. A favorably situated plantation in the center of Java, where extensive and regular cultivation of kapok exists, yields during the fifth year about 5 piculs of pure kapok from 250 trees per bouw. Older plantations give more kapok than younger ones. Sometimes isolated and very strong trees yield much larger quantities, and cases have been known where one tree in one year gave 1 picul of clean kapok, but this is of course exceptional.

The kapok flowers about the end of the west monsoon or the beginning of the east monsoon. The fruit ripens toward the end of the east monsoon. When the fruit is ripe it has a yellow-brownish color. It is necessary then to harvest as soon as possible, as otherwise the fruit, when hanging too long a time bursts at the top end, whereby the rain gets inside and the cotton is blown out by the wind.

It is recommended to open the harvested fruit as soon as possible and to take the cotton out. If this is not done quickly the color and the gloss get spoiled. Also if the fruit has been wet by rain it is better to take out the cotton before drying it.

It is very bad to cut off the fruit before it is ripe and by fermentation try to give the cotton the appearance of being cut ripe, as has been done recently on account of the high price of kapok. Such a product is always inferior and its presence in a few bales can considerably reduce the value of the whole. In case the heavy rains or late harvesting make it necessary to collect the last fruit in an unripe state, such products must be

always kept separate and sold as second quality. It is also very bad to moisten the kapok so as to increase the weight.

METHODS OF GINNING.

The seeds are separated from the cotton by beating with sticks. Small quantities of kapok are usually cleaned by hand. The kapok is usually laid on bamboo tables and beaten with thin bamboo sticks, so that the seeds drop through the bamboo and the kapok remains on the table. When in large quantities, the kapok is cleaned in mills consisting of a horizontal cylinder of wood or iron with rows of pins placed perpendicularly on the inside of the cylinder. Inside the cylinder a shaft turns round on which pins are put in such a way that they almost meet those in the cylinder. At one end of the cylinder the kapok is put while at the other side there is an opening for taking out the cleaned kapok. Over the whole length of the bottom of the cylinder, wire netting is placed, through which the seed can drop. Such a mill can be operated by hand or by machine. Other machinery for cleaning kapok is not used in Java.

It is of great importance that no seed should remain, for if the kapok contains even a few of them it has a bad effect on the market price. Formerly the kapok was beaten till the curly part of the cotton disappeared altogether, but lately this part is preferred so that the kapok must not be beaten more than is necessary to get the seed out. The weight of cleaned cotton in one pod is about one-half the weight of the seed.

BALING AND SHIPPING.

For shipping, the kapok is packed in bales by means of hydraulic or hand presses of more or less the same character as those used for tobacco. The weight of a bale is about $36\frac{1}{2}$ kilos with dimensions of 53 by 75 by 99 centimeters. These are the dimensions immediately after pressing but they vary slightly as the kapok expands considerably after it has been pressed. To prevent this, sometimes two bales are put together in the press with iron hoops. As the freight is calculated by measurements, it is of importance to have as small bales as possible. Still the kapok must not be pressed till it loses its springiness as it thereby loses in value. Sometimes bales weigh about 40 kilos measuring 80 by 63 by 68 centimeters. The bale is usually covered with gunny or matting. In Holland they prefer mats, as the tare is less variable; for Australia gunny is generally used.

THE VALUE OF THE SEED.

From the seed, oil is pressed or extracted which is used as a table oil and for making soap. After taking off the skin, which weighs about 45 per cent of the weight of the seed, the seeds give about 25 per cent of oil. The residue is a very good manure containing about 5 per cent of nitrogen. The greater part of the seed is not made into oil in Java, but is exported, principally to Marseilles. Where it is difficult to press the oil out of the seed or to sell it, it is usually ground into pulp and used for manure. The skin of the seed can be burned or put in heaps exposed to the rain and the wind till all is rotten, and then used as manure. It is always recommended to use such manure on kapok plantations.

ENEMIES OF KAPOK.

As yet kapok suffers little from diseases or attacks by insects. The most troublesome pest is the insect *Batocera hector*, which can kill the trees, but is fortunately rare. The best way to fight this insect is, as soon as one sees the holes in the tree, to try to catch it with a bit of wire, or if this can not be done, to put a small quantity of benzine in the hole and seal it up with clay.

Sometimes the fruit is attacked by another insect, *Earias fabia*, but this is more common in cotton. Also a red and black bug, the *Dysdercus cingulatus*, sometimes attacks the fruit.

Helopeltis sometimes attacks the leaves but it is rare in kapok. In general so far the damage to kapok by insects is very small, whilst other diseases produced by fungi are unknown. Sometimes damage is done by a parasite (*Loranthaceen*, *Jav. pasilan*) which nestles on the branches and causes them to die. As these parasites multiply very quickly by seed it is recommended to cut them out regularly, also the ends of the branches if they show signs of dying. The best time for doing this is after the west monsoon.

The greatest damage is done by bats which are very fond of the young fruit when it is still fresh.

THE COFFEE PLANTATIONS OF TONKIN.¹

By Dr. P. J. S. CRAMER,

*Chief of the Botanical Laboratories of the Department of Agriculture,
Dutch East Indies.*

In the course of a visit to the coffee plantations of Tonkin, I had opportunity to obtain information at first hand regarding certain questions which have arisen in connection with these agricultural ventures. While the purpose of my visit was primarily to study the deformation of the flowers of *Coffea arabica*, which has caused much well-founded anxiety among the planters, I was not limited to this investigation alone, and the following observations were made upon other matters which arose, as well as the main object of study.

Virescence.—Virescence is a phenomenon often observed in connection with the flowers of *Coffea arabica*. This degeneracy takes various forms. In one case, when it is very marked, the flower is reduced until it is about 3 millimeters in diameter, and resembles a small green star. The petals are transformed into tiny greenish points, triangular in shape, measuring at the base scarcely 1 millimeter. Again the flower is almost white, the undeveloped pistil and anthers and the rolled petals indicating virescence. Between these two extremes all degrees are found. As a rule the ovaries of virescent flowers do not develop. It happens, however, that small fruits are found on the branches of the coffee trees which apparently come from the virescent flowers, according to information given me by Mr. Bernard. It appears that these small fruits remain attached to the branches for almost a year. Upon examination under a microscope it is seen that these berries owe their development to excessive growth of the mesocarp, while the seeds remain undeveloped. An abnormal phenomenon is seen here in the brown color of the tissue about the hilum. The size of the ovule is scarcely increased. Virescent flowers then, never result in fruit, and it

¹From *Bulletin Economique*, No. 78, Mai-Juin, 1909, a report presented to the governor-general of Indo-China by Doctor Cramer.

is evident that continual recurrence of this irregularity will result in a decided shortage of production.

As for the various causes to which this deformation of the flowers may be attributed, it was thought at first that they were to be found in a parasitic malady, like the virescence of flowers due to *Phytoptes*. The careful studies conducted by Doctors Rurel and Zimmermann, however, led to the conclusion that there is no parasite present. The cause was next sought for in the physiological condition of the tree, and the conclusion reached that any factor interfering with the nutrition of the tree might cause virescence of its flowers. Some examples may serve to indicate this. The first flowers which appear on the tree are rarely affected in this manner. This would demonstrate the strong influence of the physiological condition of the tree. Observation has demonstrated also that generally when there is a heavy crop one year, the next year there will be more virescent flowers. Here too the physiological condition exerts an influence. Usually the trees flower in profusion ten days after the first heavy rains. If during these ten days conditions are not favorable to the development of the flowers—particularly when there are continual rains—a large percentage are virescent. In the very humid region of Banjoewangi, in the eastern part of Java, it often happens that two or three flowerings which give promise of being abundant will fail, all the buds opening as virescent flowers.

Excessive dryness will often produce the same result. When the first rains are not sufficient the majority of the buds open too soon, generally producing stunted or virescent flowers. Sudden exposure to the sun in a plantation that has been well shaded may result in the same way.

Soil as well as climate may have a similar effect upon coffee trees planted upon hillsides, where, due to erosion, the superficial layer of earth has been washed away, leaving the roots bare. In such cases only imperfect flowers are found. In plantations where the soil is very rich in humus the phenomenon is less frequent than in poorer ground, and especially stony ground.

Finally, parasites, which sap the vigor of the branches, often occasion virescence. When the *Pentatroma pleybya*, a hemipter, attacks coffee trees, imperfect flowers are usually found above the puncture. On trees attacked by root parasites or grubs, a large part of the flowers develop as green stars.

It was not possible to determine just how far climatic influences contributed to the virescence of coffee flowers in the

Tonkin plantations. For that a more thorough knowledge of the climate than could be gained in a brief sojourn, and more complete information regarding the distribution of rainfall, would be necessary. I take this occasion to emphasize the necessity for registering the rainfall accurately. A very simple and inexpensive apparatus will suffice for this purpose. A knowledge of the rainfall is of the greatest possible importance to the planter, and will help him to forecast the yield.

As for the soil, I do not venture an opinion, this factor being so different from that of Java. I can only advise that the soil be improved with farm and green manures, as well as by means of chemical fertilizers. The dangers attending erosion are also worthy the attention of the planters. In Java experience has taught the planter that he must first of all do everything possible to protect his land against erosion. I have been struck by the fact that in the majority of the plantations of Tonkin this difficulty has not yet arisen. I have seen plantations installed on the sides of hills, with irrigating ditches running down the slope. In Java, under the same circumstances, a plantation would be terraced, or at least the irrigating ditches would be made perpendicular to the slope, and by running them along the same horizontal plane the top layer of soil is not lost. I can not insist too strongly upon the necessity for such measures. Upon asking a planter why he did not run the ditches in a horizontal direction, I was told that they filled up too quickly. But it is just this result that is to be desired, and when the ditches no longer fill up, it will be evident that all the good earth has washed down into the lowlands.

Finally, as a cause which may have some influence upon the formation of abnormal flowers I may cite the gnarls or excrescences which grow upon the trees. These are without doubt due to a parasite, and are worthy a more detailed treatment.

These excrescences develop upon the branches. The characteristic feature in connection with them is that many of the adventive buds which in the normal state would not develop, give rise to branches. On the primary branches are found more or less thick tufts of little twigs with very small leaves, pale green at the base. Among these twigs are usually found a number of flower buds, and the branches are also covered with them. It is remarkable that nearly all of these buds result in abnormal flowers, though when one of the branches grows out and frees itself, so to speak, from the evil, it produces normal flowers.

Not only do these excrescences produce neither flowers nor fruit, but they draw the sap, becoming like parasites upon the

trees, and depriving the other branches of the nourishment that should go to flowers and fruit. Thus they contribute both directly and indirectly to the formation of a large number of abnormal flowers. I attempted to discover in a rapid examination to what cause these excrescences may be attributed. Time not permitting any profound study on the subject, it is not surprising that it was impossible to establish any conclusion. I can only say that we did not find any traces of a parasite in them that could be taken for an insect's puncture, like the kermes of fir trees.

The trouble, though widespread, is not yet of sufficient importance to cause uneasiness, and probably the plantations which suffer from it could be easily relieved by cutting off the affected parts and burning the débris. Though for a time after such a cutting the plantations might look scanty, the planter should not hesitate, because in a few months the trees will have largely recovered. When trees are suffering very much from gnarls (excrescences), cutting back may be resorted to. The trunk is cut off to about a foot above the ground, and care taken to cut obliquely, so that the rain will run off easily and not start decay. When the new sprouts appear, two or three of the most vigorous are saved. It is well to reduce the number to one, later, unless several main branches are desired.

And now a few words concerning pruning. I have noticed that the Arabian coffee tree in Tonkin is much more bushy than in Java. I believe this may be attributed to the slower growth of the tree in Tonkin. It is clear, this being the case, that the same system of pruning which applies in Java will not serve here, for in Java the aim is to keep the tree well tufted, while in Tonkin the trees are trimmed so as to render them more open and not so bushy. However, the points which follow have general application in coffee pruning.

If one of the young sprouts is allowed to grow on a topped tree, it will behave just like a young plant. This characteristic has often been observed in other plants. It is well known that a young plant rarely produces abnormal flowers. Hence the number of such flowers will be decreased by letting the sprouts develop. The blossoms on these young branches always set fruit, and so one is sure of a yield. But it can not be denied that this new crop is at the expense of the older portion of the tree. Competition between the two parts of the tree may go so far that the older part will gradually drop its leaves, all the sap being drawn up into the younger portion. Evidently some measures must be taken to prevent the old tree's being entirely

denuded. The most simple one is to cut back the young growth. The question arises as to whether it is not better to let the sprouts grow, in order to prevent excessive bushiness in the lower part of the tree, and if it would not be well to apply a system of pruning in use in Java, in very humid localities, where the trees tend too much to develop leaves. This system is as follows: The topped tree is trimmed for some years so as to form a shrub with strong primary branches. Then one or two sprouts are allowed to develop at the top. A year or so later a new sprout is allowed to grow beside the first, and after it begins to make some progress the first may be cut off. By proceeding thus the top of the tree is renewed, so to speak, every two years. This could probably be continued for some time. If the lower part of the tree should show signs of wearing out a year's rest will restore it.

On the Bernard plantation I saw fairly large trees pruned in this way, and the flowers on the tree tops were in very fine condition. I have been told that in many places typhoons interfere with the success of this method, but it seems as if this danger might be averted in plantations well shaded by hard-wood trees.

Another system of pruning employed by Mr. Bernard consists in cutting out a number of the lower branches of the tree in order to admit more light and air. This system might be compared to the one formerly in use in Ceylon, where the secondary branches were cut alternately on the left and right sides. It seems to me that by means of this system the young wood of the tree would be kept in better condition than by cutting back all the primary branches and saving but a few at the top. Otherwise there is not enough of the old wood to provide surface for the new growth.

Finally, the soil is to be considered. Often the soil lacks a sufficient amount of humus, and to meet this need fertilizers are applied, farm manure if possible, and if not, chemical preparations. I have been asked if an excess of the latter does not produce virescence in the flowers. From knowledge of conditions in Java, where virescent flowers appear frequently in plantations upon which no chemical fertilizers whatever have been used, I can easily affirm that they have no such effect. But while an excessive amount of chemical fertilizers may not be the specific cause of virescence, it should not be forgotten that even its exclusive use will not add enough humus to the soil. That can only be accomplished by means of shade trees and green manures.

It is most desirable, from every point of view, to plant shade trees among the coffee trees. Erosion is thus diminished, the soil is constantly supplied with humus, and the coffee trees are protected against sudden changes of temperature and strong winds. Thus far the principal trees employed for shade are the following:

- Eleurites cordata.*
Melia azedarach.
Albizia lebbek.
Eriodendron anfractuosum.
Grevillea robusta.

Albizia lebbek is the only one of these belonging to the *Leguminosæ*.

Experiments at the Bangila experiment station in Java, as well as those conducted by men regularly in the business, have demonstrated that it is always desirable to choose shade trees from among the *Leguminosæ*, the leaves and débris of which form very valuable fertilizer. But for Tonkin probably some variety of hardwood would be better. The *Leucoena glauca* and the *Deguelia microphylla* I should recommend highly. Both have given excellent results in Java. It would be well to plant at least two kinds, so that if one variety should not do well the other would still suffice to protect the coffee trees.

Another method of supplying the soil with humus consists in the application of leguminous plants, either by planting between the coffee trees from time to time, or before the plantation proper is set out. In the latter case one is more free in his choice of plants. It is an extremely good plan when the land is cleared to plant legumes upon it for a year before setting out the coffee trees. I should recommend as good plants for this purpose *Phaseolus lunatus*, the *Mucuna*, the *Crotalaria* (*C. striata*, *G. laburnifolia*, *C. incana*). These are, of course, turned under the surface of the soil, before the main planting.

For the intercalary culture (the legumes planted between the trees from time to time) the *Crotalaria* may be employed, and *Tephrosia purpurea*. The latter has the advantage in that it may be cut several times. *Leucoena glauca*, when cut now and then to prevent its growing into a tree, makes good fertilizer.

While these plants are primarily for green manure they have the additional advantage of preventing erosion. Upon hillsides it is desirable to terrace the land, and when the slopes are covered with legumes erosion is reduced to a minimum. In turning the legumes under the soil the stems are cut several centimeters above the ground, so that the surface remains

covered. Irrigating ditches should always be perpendicular to the direction of the slope, and a pronounced fall should be avoided.

On the whole, our observations may be summarized as follows:

(1) Virescence of coffee flowers is a physiological phenomenon due to the plant's lack of nourishment, and may be the result of climatic, pathological, or agrological conditions.

(2) The climate is a factor beyond our control, but the others may be dealt with as follows:

(a) The excrescences which grow upon the trees should be carefully removed.

(b) Because of the climate a method of pruning is necessary which shall develop young wood on the tree, either upon the primary branches or the younger growth at the top of the tree.

(c) The conditions of the climate and soil will be improved by planting among the coffee trees shade trees, preferably *Leguminosæ* (*Leucoena glauca* and *Deguelia microphylla* being the most desirable).

(d) The soil may be improved, first, by growing legumes (such as *Kratok* or *Mucuna*) on it for a year before planting the coffee, and turning the legumes under the soil after they have attained their rapid growth; and second, by intercalary cultures of *Crotalaria* or *Tephrosia*.

(e) Where the land slopes, the soil should be protected from erosion by means of terraces and the application of plants which will serve as green manure.

CURRENT NOTES.

A CHIEF VETERINARIAN FOR THE BUREAU OF AGRICULTURE.

For some time the Bureau of Agriculture has been without a chief veterinarian. The matter of stamping out infectious animal diseases has received much attention from the Secretary of the Interior and the Governor-General as well as from the Director of Agriculture. For some time these officials have been looking for a man of the necessary qualifications and it is now believed that they have secured the right man to take charge of the work in the person of Mr. Archibald E. Ward, who is a professor in the agricultural department of the University of California. Mr. Ward is to receive a salary of ₱6,000 a year with the understanding that this will be increased in case he proves to be the man desired for the place. It is believed that the danger from these diseases should be reduced to a minimum, and that they should be under the control of a competent veterinary force the same as are similar infectious animal diseases in the United States and Europe. Mr. Ward will certainly have the cooperation of the different members of the Bureau of Agriculture in his undertaking as well as the best wishes and support of all intelligent persons interested in the development of agriculture and the general welfare of the country. He will sail from San Francisco early in July and will take immediate charge of the work to which he has been assigned, upon his arrival in the Islands.

JAVA AGRICULTURIST IN THE PHILIPPINES.

Preparatory to the coming fiber congress which is to be held in Sourabaya, Java, Dr. E. de Kruyff, managing director of the division of technology for the department of agriculture in Java, has been visiting the Philippines. Dr. de Kruyff, spent about two months in the hemp fields and fiber districts of the Islands studying Philippine conditions with reference to the growing of fiber plants. He was also interested in the progress made in the manufacture of fiber-stripping machinery in the Philippines. Dr. de Kruyff left for Java the first week of February.

TOBACCO EXPERTS FOR THE CAGAYAN VALLEY.

By arrangement with the Bureau of Education Mr. Charles M. Mahan, a graduate of the agricultural department of Kentucky State University, at Lexington, Kentucky, was transferred from the Bureau of Education to the Bureau of Agriculture in January and left for his station at Ilagan in the Cagayan Valley on January 6. Mr. Mahan is a native of the State of Kentucky and resided in one of the tobacco-growing sections until he entered the university. After graduating from the State University in 1907 Mr. Mahan spent a year and a half at the Kentucky State experiment station, during which time he gave special attention to the growing of tobacco. In 1908 he was granted the degree of M. S. by his *alma mater* for his proficiency in science and agriculture.

It should be stated that Mr. Boltus E. Brewer, of the Bureau of Education, who is also an agricultural graduate and a tobacco expert, has been transferred by his Bureau to the Cagayan Valley. Both Mr. Mahan and Mr. Brewer will, in behalf of their respective Bureaus, do every thing they can to assist the tobacco growers in Cagayan and Isabela Provinces.

HAWAII'S INDUSTRIAL AGENT IN MANILA.

Mr. H. P. Wood, chairman of the Hawaiian promotion committee, recently made a short visit in Manila while on a trip around the world. Mr. Wood has been a good friend of the Philippines and has done much to help the Merchants' Association and others in giving a right idea regarding the commercial and agricultural possibilities of the Islands.

A NEW LINER FOR THE INTERISLAND FLEET.

It has just been learned that the firm of Inchausti & Co. have under construction in England a new steamer which it is expected will be in Manila ready for service about the first of August. The plans for this new steamship were sent to England some months ago. The new steamer will be a 16-knot liner for the Manila-Iloilo run, and will make the trip in twenty-four hours, which is twelve hours shorter than the time taken by the best steamers now on this run. It is understood that the new steamship will have forty first-class cabins and double the cargo capacity of the steamship *Panay* which is now used by Inchausti & Co. The merchants and residents of Iloilo are justly jubilant over this good news and the inauguration of the one day service between Iloilo and the capital of the Islands will be fittingly celebrated on the first arrival of the new steamer in that port.

AN EXPERIMENT WITH THE MULBERRY IN NEGROS.

In compliance with the request of a representative of the Agricultural Association for Panay and Negros which was received last September, this Bureau shipped 20,000 cuttings of mulberry trees for experimental planting in the Province of Occidental Negros. Five thousand of these cuttings were consigned to Mr. Timoteo Unson of Bago and 5,000 to Messrs. Felix Robles, Gregorio Rodriguez, and Victoriano Rodriguez of La Carlota. The 15,000 sent to La Carlota were set out on the 5th day of October and the 5,000 consigned to Bago on the 10th. After the planting of these cuttings requests came in from different farmers of Negros for 30,000 more cuttings which the Bureau was unable to furnish. A report on these plants received on November 6 showed that both the cuttings set out in Bago and La Carlota had had a rapid and healthy growth. Apparently the plants are adapting themselves to the soil in this section; as at least 90 per cent of them have taken root and are growing so fast that it was intended to transplant them in the middle of December. As the land at Bago and La Carlota is 12 to 14 meters above sea level it is believed that this elevation contributes to the healthy development of the plant. Relying upon the mulberry trees at the experiment station for food these farmers were planning to import some Japanese silkworm eggs at the beginning of this year to start their experiment in raising silkworms. It is expected that these cuttings will develop sufficiently within the first three or four years to permit the importation of a considerable number of immunized and properly selected silkworms. This experiment which is being carried on by the farmers of Occidental Negros will be watched by other agriculturists with a great deal of interest.

AUSTRALIAN COMMERCIAL AGENT IN MANILA.

Mr. J. M. Sinclair, commercial agent in the Orient for the government of the State of Victoria, Australia, recently spent some time in Manila where he is looking after the interests of Australian trade or furnishing information for those desiring to travel in Australia. Mr. Sinclair has his headquarters at Singapore, an office in Shanghai, and travels all over the Far East. While his business is to develop trade between Australia and other countries of the Orient he is particularly interested in the growing business between the Philippines and Australia.

PHILIPPINE POTATOES.

Probably one of the most interesting agricultural experiments now being made in the Philippine Islands is that which is being carried on by the subsistence department of the United States Army near Camp Vickars in Mindanao. Just outside of Camp Vickars the military government has reserved several hundred acres of desirable land on which it intends to carry on the experiment of raising potatoes on a large scale. In the early part of December a member of this Bureau visited the potato farm where about 15 or 16 acres have been planted with seed from the United States. To all appearances the plants are doing fully as well as potatoes would in any part of the States. Only Moros are employed as laborers on the farm and it is understood that it is the intention of the subsistence department to train their Moro employees to raise potatoes for the Army instead of importing them from Japan as is being done at present. A crate of potatoes which were grown by Moros outside of the reservation was recently forwarded to Manila from which a liberal supply was furnished this Bureau. So far as determined these potatoes were equal in quality to any grown in the United States. While they were not so large as imported potatoes or as large as some which have been received from Benguet and Cagayan, yet they were of a desirable size and large enough to make it profitable to use them providing the industry can be successfully carried on. There is every reason to believe that the crop which is coming on at the potato farm near Camp Vickars will be far superior both in size and quantity to those raised by the inexperienced Moros. It might be added that potatoes grown from seed and onions grown from sets imported from the United States by Mr. T. L. Lewis, superintendent of the San Lazaro Hospital, Manila, in his garden on Calle Cervantes were fully equal in size and quality to the average potatoes and onions grown in the United States.

UNITED STATES TOBACCO EXPERTS IN MANILA.

Mr. H. H. Esberg, vice-president and general manager of the American tobacco firm of M. A. Gunst & Co., arrived in Manila on the last trip of the steamer *Manchuria* for the purpose of investigating the quality of Philippine cigars and the prospects for the trade. Mr. Esberg states that Gunst & Co. have found Philippine cigars very satisfactory. He also states that it is important that the manufacturers of Philippine cigars send their best product to the United States and that the future of

Philippine cigars in the United States will depend almost entirely upon the character of the exports by the cigar factories of the Islands.

Another tobacco expert who came to Manila on December 18 is Mr. B. B. Rich of the United Cigar Stores Company, the largest retail house in the world. Mr. Rich states that there has been a steady increase in the number of Philippine cigars sent to the United States since the making of their first contract last May by Mr. Edward Wise, vice-president, and Mr. John F. Whelan, treasurer, of the United Cigar Stores Company, at which time both of these gentlemen visited Manila. He believes that within the next year or two the Manila factories will be sending to the United States the full quota of cigars allowed free entrance under the new tariff law. Mr. Rich states that he finds the Philippine factories cleaner than those of the United States, and that the workmanship of Philippine cigars is equal to that of any in the world. The United Cigar Stores Company has 600 stores and is the largest individual buyer of any factory in the United States, Cuba, Porto Rico, or the Philippines.

According to other information the tobacco trust has stirred up the labor unions in the United States against the products of the cheap labor of the Philippines and has endeavored in every way possible to keep Philippine cigars out of the United States market.

A SUBSIDY FOR THE MANILA-INDO-CHINA STEAMSHIP SERVICE.

It has been announced that the government of Indo-China will subsidize the steamship service between Manila and Saigon during the year 1910, also that a quick and direct service will be encouraged by Government subsidy between Haiphong and Hongkong, and the service between Bangkok and Saigon improved. It is stated that the French Government in Indo-China already pays subsidies to its steamship lines exceeding half a million dollars annually. It is believed that the Manila-Saigon line will be a profitable one from the freight standpoint, at least, as over 100,000 sacks of rice were imported monthly from Saigon during the last four months of 1909.

THE ORIENTAL PRODUCTS COMPANY.

One of the most gratifying moves on the part of a government official to all those who are interested in the welfare of the Philippines, and especially to those who are anxious to see the Filipino people obtain the largest results from the provisions of the Payne Tariff Law, is doubtless, that made by

Mr. John. S. Hord, formerly Collector of Internal Revenue, when he handed in his resignation as Director of one of the most important Bureaus in the Philippine Islands and associated himself with the Oriental Products Company, which has been recently organized in the United States. To anyone who studies the situation at the present time it is very clear that Philippine products when entering into competition with the natural products of the United States must meet with the closest competition, and it is clear to everyone that the tobacco growers and manufacturers of the United States will not surrender any part of their interests or business to the growers and manufacturers of Philippine products without the greatest opposition. It is therefore obvious that in order to successfully compete in the United States with United States products, Philippine growers and manufacturers must have duly authorized representatives or distributing agents in all parts of the country.

It was for this purpose that the Oriental Products Company was organized in New York City with its head offices in the Tontine Building, No. 82, Wall Street. The officers are Mr. Charles Landau, president; Mr. Harry Rothschild, treasurer; Mr George W. Gibbs, secretary; Mr. John S. Hord, managing director in the Philippines, and Mr. Charles B. Cameron, tobacco expert. Mr. Charles Landau, the president of the company, is general manager for Upmann & Co., and Mr. Harry Rothschild of Rothschild Brothers, the treasurer, is also treasurer of the Waldorf-Astoria Cigar Company, which has a string of stores in the largest hotels and clubs in the United States. Mr. George W. Gibbs, the secretary, was formerly in the internal-revenue service in Porto Rico, and for the past two years has been engaged in business in New York City. Messrs. Upmann & Co. and Rothschild Brothers are two of the largest independent cigar manufacturers in the United States. They have for many years successfully opposed the American tobacco trust, and, beside increasing their trade, have maintained the quality of their goods. The New York office is in charge of Mr. Gibbs, the secretary, and Mr. Cameron, the tobacco expert, is now in the Philippines, having come to Manila with Mr. Hord. During the early part of January Mr. Cameron and Mr. Hord left for the tobacco sections in the Cagayan Valley.

At the suggestion of Mr. Hord an association of local manufacturers has been organized, the directors and officers of which will soon be announced. Mr. Hord states that the Oriental Products Company will not go into business in the Philippine

Islands either industrially or agriculturally as their organization is purely for commercial purposes. Later it is the intention of the company to develop other lines of business than the tobacco trade, such as the straw-matting industry, for which article the United States pays \$7,000,000 annually to Japan and China.

The company has ample capital and a corps of strong and experienced stockholders, as well as the necessary agencies for distribution. Mr. Hord considers his resignation in the light of a duty to the Filipino people to whom he had promised to do everything in his power that they might receive the full benefits of the free-trade provisions of the new tariff law. Unless their interests are safeguarded by some such an organization or association as the Oriental Products Company, who will carry out the plan above outlined for the distribution of Philippine products in the United States, it is clear that the Filipino people will not enjoy the full benefits of this provision of the tariff law which the President of the United States and the leading advocates of the law desired.

NEW STEAMSHIP LINES BETWEEN THE UNITED STATES AND MANILA.

By the readjustment of the sailing schedule of the Great Northern Steamship Company the steamship *Minnesota* will call at Manila both on its outward bound and homeward bound voyages. By the new schedule the *Minnesota* will sail from Seattle to Yokohama, Kobe, Nagasaki, Manila, and Hongkong, and returning from Hongkong Manila will be the first port of call, from which port the vessel will sail for Seattle via Nagasaki, Kobe, and Yokohama. By this arrangement Shanghai is dropped from the ports of call of the Great Northern Steamship Company.

It is stated that the Osaka Shosen Kaisha have entered into a contract to handle the trans-Pacific cargo of the Chicago, Milwaukee and St. Paul Railroad between Tacoma and points in the Far East. The Chicago, Milwaukee and St. Paul Company have arranged to run their trains over the Chicago, Milwaukee and Puget Sound Railroad Company's lines to Tacoma. This company has given special attention to carrying fast freight from Chicago and way points to the Pacific coast and its intention is to give the quickest possible service between Chicago and points in the Far East. The Osaka Shosen Kaisha will open up this service with two steamers, the *Tacoma Maru* and

the *Seattle Maru*, which will make monthly sailings; however, the company intends to run a fortnightly service and to this end they have under construction four other steamers namely, the *Chicago Maru*, the *Panama Maru*, the *Mexico Maru*, and the *Canada Maru*, all of which will have a minimum speed of 15 knots per hour. It is intended that all of these steamers will make Manila a port of call and the first vessel to make the trip will be the *Tacoma Maru* which will leave Tacoma for Yokohama, Manila, and Hongkong about February 1 reaching Manila about March 1.

It is also stated that the Grand Trunk Pacific Railroad Company will build and run a thoroughly up-to-date fleet of modern steamers across the Pacific in connection with their transcontinental railroad lines. This new fleet of steamers will run from Port Rupert in Canada to the principal ports of call in the Far East. It is understood that Manila will be included with these ports and that an agency will be established in this city. With the completion of the arrangements above mentioned Manila will have direct communication with the United States over not less than three competing commercial steamship lines.

THE INSULAR LUMBER COMPANY.

The work of the Insular Lumber Company records the most remarkable progress that has been accomplished by any single industry in the country. The sales of this company during the month of November amounted to 1,000,000 board feet and the manager, Mr. A. Burlingame Johnson, states that even this amount would have been exceeded but for the inability of the company to fill more orders. The company has been compelled to decline single orders for as high as 100,000 board feet. Of the million board feet sold, 300,000 board feet were shipped to the United States and the remaining 700,000 was for consumption in the Philippines.

This company is installing an electric-light plant which will enable the 800 hands which the company employs on its concession and in its sawmills in Negros to work on night shifts as well as days. The company is also installing a new mill which has a capacity of about one-half of the old mill. It is expected to have the electric-light plant and the new mill in operation by the end of February.

It is understood that another company has been organized in Negros which will install a large mill and supply part of the orders for Philippine lumber which the Insular Lumber Company has had to refuse.

SHIPMENTS OF PHILIPPINE CIGARS.¹

Shipments of cigars to the United States of America during October, 1909.

Exporters.	Cases.	Kilos.
Messrs. Castle-Bros., Wolf & Sons	457	55,655
Messrs. Meerkamp & Co. (La Maria Cristina)	148	18,684
Compañía General de Tabacos	140	22,967
Messrs. Baer Senior & Co.'s Successors (La Yebana)	90	13,837
Messrs. Walter E. Olsen & Co	73	10,489
Philippine Co. Ltd. (La Comercial)	71	9,465
Messrs. Germann & Co. Ltd. (Helios)	32	3,833
Messrs. J. Santa Marina (La Insular)	18	2,196
La Germinal	15	2,882
Messrs. Chiong Yu Nam	13	1,728
Messrs. Haddix & Kings	10	1,657
Messrs. Perez Hermanos	10	1,529
Katubusan	10	1,100
Messrs. W. H. Andeson & Co	8	1,380
Philippine Products Co	5	883
Messrs. Macondray & Co	5	544
Messrs. Connell Bros	1	145
Mr. F. Kuttner	1	88 $\frac{1}{4}$
Total	1,107	148,462 $\frac{1}{4}$

In all for the month approximately 10,000,000 cigars making in all to date under free trade about 17,000,000 cigars.

Shipments of cigars to the United States of America during November, 1909.

Exporters.	Cases.	Kilos.
Compañía General de Tabacos	304	36,227
Messrs. Castle Bros., Wolf & Sons	262	32,069
Messrs. Baer, Senior & Co.'s Successors	129	19,853
Messrs. Walter E. Olsen & Co	93	12,509
Messrs. Germann & Co. Ltd.	46	4,961 $\frac{1}{4}$
Messrs. Meerkamp & Co	46	3,590
La Insular	34	3,249
Philippine Co., Ltd	33	4,822
La Germinal	22	3,946
Messrs. Kuenzle & Streiff	16	2,397
Messrs. Chiong Yu Nam	14	2,348
Messrs. La Cibeles	6	708
La Alejandria	4	590
Manila Warehouse Co	3	455
Messrs. Connell Bros	1	163
Messrs. Sullivan & Francis	1	157
Total	1,014	128,044 $\frac{1}{4}$

Approximately 10,000,000 for the month and 27,000,000 to date under provisions of the Payne Bill.

UNITED STATES ESTIMATE OF THE PHILIPPINE TOBACCO INDUSTRY.

It has recently been learned that La Insular Cigar and Cigarette Company were during the past year offered \$4,000,000 gold by the Murray Commercial Company of Seattle for the La Insular Cigar and Cigarette Factory and its business. This report has been confirmed by Sr. Antonio Barreto, the general

¹ From The Far Eastern Review, Vol. VI, No. 7, December, 1909.

manager of the company. While Sr. Barreto himself favored the sale to the Seattle company, the majority of the board of directors decided that they did not care to sell. It is also stated that as a result of the increase in the wages paid to the employees of the factory that they work only four days each week when previously they worked five and six days. This is also said to be true in the tobacco fields in Cagayan and Isabela as the laborers in the fields, as well as those in the factory, are so ignorant and lacking in industry and enterprise that they care only to earn a sufficient amount for their actual needs and seem to have no thought of providing themselves with better food, clothing, and home environments or of accumulating money for future needs in case of accidents, sickness, or when they have reached old age. This problem is apparently one that can be solved only by education which will make the laboring man desire better things for himself, as well as for his family.

Such an offer by a large business organization in the United States should arouse everyone interested in the tobacco-growing industry in the Philippine Islands to a realization of the possibilities and the value of this industry to the people of the country. The Filipinos, those interested in the development of the agricultural resources of the Islands, and everyone interested in building up the agricultural, commercial, and industrial wealth and credit of the country should see in this single business proposition a sure index of the large results to be obtained from money and energy invested in the tobacco-growing business of the country.

THE TOBACCO CROP FOR 1910.

A careful investigation made by a representative of one of Manila's leading dailies reveals the fact that while most growers of leaf tobacco have been able to sell their crops for fancy prices, and the demand for Philippine tobacco has been greatly increased on account of the passage of the Payne Bill, it is not expected that there will be a shortage in the crop for the coming season inasmuch as investigation at the leading cigar factories shows that the present demand is more for quality than for quantity. With the Government guaranty as to the quality of cigars exported from the Philippine Islands the question of quality is preëminently the one which concerns Philippine tobacco growers. One of the principal items with the cigar factories of the Philippines is the question of obtaining wrapper tobacco, which at the present time is very dear. Very little if any of the Philippine tobacco is fit for use as

wrappers and as a consequence a large part of the leaf for wrappers of Philippine cigars has to be imported from other countries. Judging from the best information obtainable, the tobacco sections of these Islands have as favorable natural conditions of soil and climate as can be found in any other part of the world for growing superior grades of tobacco. The tobacco planters of these Islands should now be most seriously concerned regarding the kinds of tobacco to be raised and the best methods of cultivation in order that the product of their farms may take its proper place with the tobacco from other countries. It would seem that Philippine tobacco planters at present have everything to encourage them to put forth their best efforts in the way of using the best methods for producing the very best grades of tobacco, and the Government is making every effort to coöperate with them to this end.

PHILIPPINE COAL.

The Manila Electric Railroad and Light Company are using Philippine coal mixed with Australian for their power plant which gives light to the city and power for the electric street car lines. The first shipments from the Batan mines arrived on the steamer *Rigel* on December 3 and consisted of 1,000 tons.

Later a shipment of 2,000 tons was received in Manila which was disposed of in the local markets. It is understood that the Batan mining company expects to make regular shipments and that one or two steamers of about 3,000 tons burden will be purchased to handle the output of the mines. At present this is about 200 tons per day. By the first of March it is expected that the output will be increased to 300 or 400 tons per day, or from 9,000 to 12,000 tons a month. The local demand for this coal is so great that the East Batan Company was unable to fill a recent order for 550 tons from the phosphate company on Ocean Island, and it was taken by the Mitsui Busan Kaisha. We have learned later that an order for 2,500 tons of this coal was received from Hongkong on which shipment was made about February 1.

From Cebu it was learned that the Electric Light Company of that city has contracted for the total output of the Danao mine on the Island of Cebu. The output of this mine was formerly used by the Philippine Railway for its Cebu line.

THE SMALL FARMER AND THE SUGAR INDUSTRY IN PANAY.

According to recent reports from Iloilo there has been a decided increase in the interest manifested in the sugar-growing business on the Island of Panay. For some months there have

been shipments of cattle from the China coast to Iloilo for the use of the sugar planters on Panay, and, according to the Iloilo Enterprise, reports from the country around Passi and Dueñas indicate that there is a greatly increased area devoted to growing sugar cane. According to these reports a great deal of land was already prepared in January for which it was impossible to obtain sufficient seed cane. There are a number of small cattle-power sugar mills in that section and cane seedlings are obtained from these mills as the crushing of the sugar cane progresses. It was believed that it would be some time before sufficient seedlings could be obtained to plant the land already prepared.

On the new hacienda of Evans Brothers, near Dueñas, there were over 30 hectares of land ready for planting, and amongst the small farmers in the vicinity of Passi and Calinog it is estimated that there were over 200 hectares which would be planted so soon as the necessary seedlings could be obtained. This interest on the part of the small farmers near Iloilo is one of the most encouraging signs of the revival of agriculture in the Islands.

BORNEO COAL FOR THE PHILIPPINES.

Owing to frequent famines in the local market Messrs. Behn, Meyer & Co., Ltd., have secured the sole agencies in the Philippines for the following companies: The Labuan Coal Company Ltd., on the Island of Labuan; The Cowie Harbor Coal Company Ltd., Sarawak, British North Borneo; The Brooketon Coal Mine, Brooketon, Sarawak, British North Borneo; and the Pulo Laut Coal Co., Pulo Laut, British North Borneo. A cargo of Labuan coal arrived at Manila December 17 and has been followed by regular shipments from the different companies above mentioned. The Labuan coal fields are located on the Island of Labuan, 5 miles to the northwest of Borneo and about 700 miles from Manila. There is a good harbor at Victoria on the south of Labuan Island, supplied with suitable coaling piers. These are equipped with modern machinery enabling the company to place coal in the bunkers of vessels at the rate of 50 tons per hour. Near the piers are sheds for storing more than 10,000 tons, about the monthly output of the Labuan mines. These mines, which are a short distance from the town and harbor of Victoria, are reached by railroad and the coal is mined in an up-to-date manner. Good steaming coal, which is used by the British navy and North German Lloyd Steamship Company, is obtained at this port. The Cowie Harbor Coal Company have a coaling station on the Island of Sebattik in Sibuko Bay, 360

miles south of Sandakan. The harbor has a depth of 120 feet at low water, and the equipment at this station enables the company to handle from 20 to 25 tons of coal per hour. The Brookton mine, which is on the mainland, maintains a supply for steamers at Labuan as well as at the mines. The Pulo Laut Coal Company is situated on the west coast of the island about 6 miles southwest of Kotta Baroe. It is said that this company can load about 40 tons of coal an hour.

This arrangement on the part of Messrs. Behn, Meyer & Co. will greatly increase the supply of coal in the Manila market and open to the Philippines a source of supply which is much nearer and more easily reached than either Japan or Australia, upon which the consumers of coal have had to depend in time past. One thousand five hundred tons of Borneo coal consigned to Behn, Meyer & Co. arrived in Manila on January 6 and we have since been advised that the Philippine Railway Company has placed an order for 5,000 tons of Labuan coal—2,500 for its line in Iloilo and 2,500 for its line in Cebu.

LABOR FOR THE TOBACCO FIELDS.

The Compañía General de Tabacos de Filipinas has asked the Bureau of Labor to assist in securing 1,500 families, preferably Ilocano, for its three haciendas in the Cagayan Valley. Ever since its establishment in the Philippines this company has been noted for its generosity toward its employees. It offers to pay the traveling expenses of each family from its home to the hacienda. It further offers to pay small outstanding debts and advance money for cloths and living expenses. The money advanced will be repaid in sums and at times convenient for the debtors, without interest. Each family on arrival at the hacienda will be given two parcels of land—one for the cultivation of corn and the other for tobacco. Up to the time that the corn crop is ready to harvest the company offers to supply tenants with corn or rice sufficient for their needs. The corn raised by the tenants will become their property and the seedlings for the tobacco crop will be supplied by the tobacco company on the condition that one-third of the crop will become the property of the company and the other two-thirds will belong to the tenant who will be under obligation to sell it to the company. On each hacienda there will be stationed a doctor to render medical attendance free of charge to all who need his attention. Medicines will also be supplied gratis. The system of giving prizes to the growers of the best and largest crops of tobacco will be continued on the estates of the company. In

addition the company will furnish a carabao for each family that desires one on the same condition as money is advanced for other purposes; that is, without interest and payable in easy installments. Director Tinio, of the Labor Bureau, left for the Cagayan Valley during the first week of January with a view to giving the Tabacalera Company and other planters of the Cagayan Valley the greatest assistance possible.

ARTESIAN WELLS.

During the latter part of November the municipal council of Noveleta, Cavite Province, appropriated ₱3,000 for an artesian well in the barrio of Rosario. The well will be put down under the direction of the Bureau of Public Works, and it is the plan of the district health officer to have one or more of these wells in every municipality.

During the early part of December the men who were working on the artesian well in plaza San Pedro in Cavite struck water at a depth of 125 feet. The water rises to within 3 feet of the surface and it is estimated that the well will furnish a flow of about 100 gallons a minute. As soon as possible a pump will be attached and a tank erected so that a supply of pure water will be available at all times. If this plan works out it is intended to lay pipes to supply the principal houses of the city as well as several hydrants for public use.

In January water was struck at 510 feet in a well which is being put down by the artesian well drillers of the Bureau of Public Works at Santa Barbara in Iloilo Province. A flow of 35 gallons per minute was obtained but the water was condemned by the Bureau of Science as containing too much mineral matter so that the well will be sunk deeper, until good drinking water is obtained.

A MODERN SUGAR MILL FOR ILOILO PROVINCE.

According to the "Iloilo Enterprise," Messrs. Evans and Weinstein, of Passi, Iloilo Province, have ordered from the United States a modern sugar mill which will be operated by a 35-horse-power engine. The new mill will be installed on the Passi estate of ~~Messrs.~~ Evans and Weinstein and will be the only mill of its type in that part of the country. As all of the other mills are old fashioned and none of them have more than three rollers, it is expected that the new mill will grind much of the cane which will be grown on the neighboring sugar estates.

THE PHILIPPINE MATCH FACTORY.

One of the most interesting industries in the Philippines is the Philippine Match Factory established by Mr. Carlos Gsell at Mandaloyan, San Felipe Neri, near Manila. This factory was established in 1902 and now furnishes employment for 550 men and women all of whom, with the exception of the foremen, are Filipinos. The daily output is 504,000 boxes of safety matches or more than four times as many matches a day as there are people in the Islands. The wood used in the manufacture of these matches is cut from lumber taken from Philippine forests so that it will be seen that this industry actually furnishes employment for a large number of people who are engaged in cutting the trees in the forest and in transporting the lumber to the factory, in addition to the 550 men and women who are actually engaged in the manufacture of matches. Such industries should receive the support of everyone who takes pride in the prosperity of the Philippines and quality and quantity being equal consumers should always purchase the product of Philippine factories in preference to buying the product of China or Japan and other foreign countries, bearing in mind that by so doing they are helping to furnish employment for their own countrymen and build up Philippine industries.

FILIPINO LABORERS FOR HAWAII.

On December 23, 150 Filipino laborers who have been engaged by Mr. O. A. Steven in different parts of the Islands sailed on the steamer *Manchuria* to work on the Hawaiian sugar plantations. Mr. Steven states that the Filipinos have been found to be very satisfactory laborers on the Hawaiian sugar plantations; in fact equal if not superior to the Koreans and Japanese who have been largely employed by the Hawaiian sugar planters. This is interesting in view of the frequent complaints from employers of Filipino laborers here in the Philippines. It recalls also the Governor-General's remarks on this subject in his inaugural address, in which he expressed himself as believing that the Filipinos, if well paid and given the proper consideration by employers, bearing in mind their peculiar inclinations, will supply a satisfactory kind and quantity of labor sufficient for the development of the Islands.

PHILIPPINE HAT AND UMBRELLA FACTORY.

In 1900 there was established by Mr. Carlos Gsell in Quiapo, Manila, a factory for the manufacture of felt and straw hats and umbrellas. This factory employs 450 men and women and

has a capacity for turning out 250 dozen hats and 150 umbrellas and parasols daily. It is estimated that there are at least 3,000 people dependent upon the match, hat, and umbrella factories of Mr. Gsell for their support. The building up of such industries in the other towns of the Islands is not only possible but just what is needed to bring prosperity to the people and the country. Men who can organize and successfully carry on such factories and business enterprises are the greatest of benefactors to the country. There is scarcely a large city or provincial capital in these Islands which does not have the natural resources necessary for establishing small factories and business enterprises. Every intelligent citizen should make it his business, and do everything in his power to encourage the establishment of factories and the organization of such business enterprises in his section of the country.

SUGAR CROP FOR 1908-9.

During the sugar season for 1908-9, 808,400 piculs of sugar were shipped from Iloilo to the United States. During the month of October shipments were made in three vessels, two going to the Atlantic seaboard and one to the Pacific. The British steamer *Inveresk* took a cargo of 5,649,207 kilos and the *Kalibia* 5,646,048 kilos; both vessels sailed for the Delaware Breakwater. The Standard Oil steamer *Seminole* took a cargo of 5,645,304 kilos to San Francisco on the Pacific coast. According to the reports of the sugar brokers, the crop for the season of 1908-9 amounted to 1,641,631 piculs, or 251,731 piculs more than the crop for the season of 1907-8. The prospect for the crop of the season of 1909-10 is estimated at 1,549,660 piculs. The falling off of the sugar crop for 1909-10 from that of 1908-9 is attributed to damage done by locusts which invaded the sugar sections of Panay and Negros early in the year. More than this, owing to the cattle diseases, many of the farmers did not have the necessary work animals and a part of the crop was planted too late to mature in season.

FORESTRY WORK OF THE YEAR 1908-9.

From the annual report of the Director of Forestry we note that the net revenue from the forestry work for the past fiscal year was ₱100,000 and that the expenses of the Bureau were ₱110,000. The Bureau employs 4 foresters, and 21 rangers and guards. Computed on the area which is being cared for by the Bureau of Forestry, 6,000,000 hectares, the Philippine forests pay the Government a little more than 1.6 centavos per

hectare while the Government revenue from the forests of Germany amounts to ₱6.30 per hectare. As compared with 6,000,000 hectares which the Bureau of Forestry is looking after, Germany has only 2,463,000 hectares of public forest, a little more than one-third of the forest area which is being cared for by the Bureau of Forestry, yet she employs 806 foresters and 3,729 rangers and guards to take care of her public forests. However, the total area of the commercial forests of the Philippines is 16,000,000 hectares and the Director of Forestry believes that this area if properly cared for would pay the Philippine Government as much if not more per hectare than is now received from the public forests of Germany.

The division of investigation does the work of inventorying forestry resources. This division has made maps showing the classification of the forest lands of northern Luzon, Masbate, Ticao, and parts of Leyte, Negros, and Mindanao. The educational work has been carried on along two lines, instruction and propaganda. A number of young Filipinos were employed as assistant rangers and taken to the forestry tract of the Cadwallader Gibson Company where they made a preliminary map of the company's logging operations. These men ran and plotted 6,015 kilometers of trails, and inspected 184 homesteads and 29 cuttings. Sixty-one lectures were given during the year by a Filipino graduate of the Yale School of Forestry and other foresters of the Bureau. It is estimated that this propaganda work reached 60,000 people. The Bureau of Forestry now has 18,109 specimens in its herbarium, nearly 4,000 more than last year. The Bureau is also doing considerable work in carrying on durability tests of Philippine woods. These tests are most important to builders in all parts of the Islands who wish to know the value of different Philippine woods; 577 tests were made at the testing ground at Lamao, in Bataan Province.

RECOMMENDATIONS OF THE IRRIGATION COMMITTEE.

At its meeting held in December last the members of the Committee on Irrigation recommended the appropriation of more than ₱1,000,000 for irrigation projects in different provinces in the Philippines. The largest sum recommended was ₱800,000 for the Ambalangan-Dalin project in Pangasinan. The next largest was for the Pototan project in Iloilo. The entire list of irrigation projects recommended is as follows:

Ambalangan-Dalin	₱800,000
Orion project in Bataan	37,000
Pototan project in Iloilo	277,000
Barugo-Leyte project	60,000
Pililla project in Rizal	5,000

On these recommendations the Department of Commerce and Police has taken no action as yet.

The Ambalangan-Dalin project will cover an area of about 30,000 hectares which will be irrigated by water from the Agno River. The principal products of this section are rice and mangoes. The first estimate for this project was ₱400,000 to cover an area of 12,000 hectares, but the area to be covered has been greatly increased so that the cost will be double the original estimate.

The Orion project in Bataan will cover an area of approximately 1,000 hectares which is principally friar lands. The leading crops are rice and sugar.

The Pototan project will include an area of about 9,000 hectares of rice land in Iloilo Province. It will be irrigated by the waters of the Suage River.

The Barugo-Leyte project lies in the northern part of Leyte to the east of Carigara.

The Pililla project, which is in Rizal, is the smallest one in the list; the area to be irrigated will not be large.

Reports from the irrigation engineers on projects in Ilocos Norte, Capiz, Iloilo, Pampanga, La Union, Batangas, Tarlac, and Bohol were received by the committee.

The committee instructed Mr. H. B. Kirkpatrick, chief of the irrigation division, to prepare an irrigation exhibit at the Carnival. This exhibit included working models of irrigation systems, photos, maps, and plans which were interesting as well as instructive.

SOME RECOMMENDATIONS OF THE PHILIPPINE COMMISSION TO THE SECRETARY OF WAR.

The annual report by the Philippine Commission for the fiscal year ending June 30, 1909, contains many recommendations to the United States Congress which are of interest to Philippine farmers:

First, that if Congress is willing to assist and to expedite the work of the United States Government in the Philippines, it make an annual appropriation of \$1,000,000 to be added to the present Insular appropriation for education.

Second, that the Philippine Government be authorized by Congress to sell \$5,000,000 worth of Government bonds and that the money realized therefrom be used for the construction of public works which are greatly needed in different parts of the Islands.

Third, that the amount of land which may be acquired and owned or used for agricultural purposes by individuals or corporations be extended to 6,000 hectares.

Fourth, that the mining laws be so amended as to allow the filing of more than one mining claim upon a single lode by the same individual or corporation, and to facilitate the taking up of claims for placer, or mines under water, and to extend the time for the development of coal mines to three years.

Fifth, that a law be passed authorizing the Treasurer of the Philippine Islands, with the approval of the Governor-General and the Postal Savings Bank Investment Board, to make loans to provinces and municipalities.

Sixth, that the amount of land which can be taken up by any person under the homestead law be increased from 16 to 50 hectares, that the amount that individuals can purchase from the Government be increased to 500 hectares, and that the amount that can be sold to corporations be increased from 1,024 hectares to 6,000 hectares.

Seventh, that the Philippine Government be authorized to give free titles under proper restrictions to people who have been in undisputed occupation of land for five years previous to the year 1912.

NOTES FROM OTHER FIELDS.

SUGAR, HEMP, AND COAL IN FORMOSA.

According to the "Far Eastern Review" for December the Japanese Government is taking a most active part in the development of the Island of Formosa. The "Review" states that the sugar production of Formosa at present is equal to one-fourth of the total consumption of the Japanese Empire and plans have been completed to install 30 more sugar mills which will have a total capacity of 4,450 tons a day. In order to encourage the growing of hemp in the Island, the Japanese Government has decided to offer a subsidy of 10,000 yen annually. Official reports place the area of the Formosan coal fields at about 35,000,000 square meters with an estimated deposit of 30,000,000 tons.

COTTON CULTIVATION IN RUSSIA.

From recent reports the area of land under cotton cultivation during the past year in the Russian provinces amounted to about 500,000 acres, which is an increase of 30,000 acres over the area planted to cotton during the preceding year. From the last reports there was every indication that the cotton crop of Russia would be a good one.

BRUSSELS CONGRESS OF AGRICULTURAL ASSOCIATIONS.

One of the most interesting congresses organized on the occasion of the Universal and International Exhibition of Brussels in 1910, will be the first international congress of agricultural associations and rural demography which will take place at Brussels next September.

Besides the official representation of most of the foreign countries, many applications for membership have already been received, and this congress promises to be in every respect a most important one.

The examination of the results achieved, the endeavor to find ways of making yet further progress through the agricultural associations, and the study of every means of improving the lot of the rural population, will give opportunities for papers and for exchanges of views, which will be of the greatest interest.

The papers and reports will form eleven volumes, which will be supplied free to all members. The membership fee is 15 francs, or \$3 United States currency, which should be sent to Mr. Vanderoaeren, 220 Chansée d'Alsemberg, Brussels, Belgium.

In most countries propagandist committees have been formed in connection with the congress for procuring writers of papers and subscribers. There is none as yet in the Philippines and an initiative taken in this way by any official committee, agricultural society, or private individual, would be very greatly appreciated.

Such committees, societies, or individuals should communicate with Mr. Vanderoaeren, general secretary, 220 Chansée d'Alsemberg, Brussels, who should know of their action before March 1, 1910.

THE TUSKEGEE FARM.

"The Rural Californian" for November, states that the colored people on Booker T. Washington's farm at Tuskegee, Alabama, have during the past year produced \$5,000 worth of oats, 300 acres of good corn, 150 acres of sweet potatoes, and 5,000 quarts of strawberries. They also milked 144 cows and produced a large amount of butter and cheese.

ONION CROP OF THE UNITED STATES.

According to the Crop Reporter of the United States Department of Agriculture, the onion holds the third place among the truck crops of the United States. The yield last year was over 14,000,000 bushels valued at \$10,000,000.

THE VALUE OF UNITED STATES POULTRY PRODUCTS.

"The Rural Californian" quotes the Secretary of Agriculture as stating that the greatest crop in America is grass and after that corn, after corn is probably cotton, then comes wheat, and after wheat poultry. The product of the hencoop is now nearly as valuable as that of the wheat field. Rice is the cereal which takes the place of wheat in the Philippine Islands, and, other things being equal, the statement of the Secretary of Agriculture contains an important suggestion regarding the development of the poultry business in the Philippines. The attention of farmers has been repeatedly called to the large imports into these Islands of poultry and eggs which naturally should be supplied by the poultry growers of the Philippines.

THE BEET SUGAR INDUSTRY IN THE UNITED STATES.

From the last reports received from the United States there were 65 large sugar factories located in sixteen different States which were in actual operation during the sugar-making season. During 1908 there were 365,000 acres given over to growing sugar beets and the farmers delivered to the factories 3,475,000 tons of beets.

GOOD ROADS IN THE UNITED STATES.

From figures recently gathered from fourteen different States, it is shown that there is an unprecedented movement through the Southern and Western States for improved highways. Contracts which are already advertised call for the expenditure of between \$25,000,000 and \$30,000,000, and but for the intense prejudice against automobiles in these States it is estimated that fully \$60,000,000 would be available for good roads. In Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, and Oklahoma, convicts are being used largely in the construction of roads. In Missouri money from licenses is appropriated for building good roads. In Kentucky the county courts set aside certain sums to be used on the roads. In Alabama the new roads are paid for partly by the county and partly by the people of the different communities. In some parts of Louisiana the police jury fees are used for the construction of roads. While engineers and competent road superintendents are lacking in all parts of the South and West, nevertheless a great amount of work has been done. In Kentucky \$25,000 a year is being raised in each county, by taxation, for road improvement. Bond issues are being made generally for this purpose. The following figures represent the actual expenditures for good roads during the last year. Alabama, \$1,576,000; Arkansas, \$1,400,000; Florida, \$578,000; Georgia, \$2,100,000; Louisiana, \$952,000; Missouri, \$873,000; Mississippi, \$1,615,000; North Carolina, \$1,359,000; Oklahoma, \$775,000; South Carolina, \$746,000; Tennessee, \$1,622,000; Texas, \$4,138,000; Virginia, \$688,000; West Virginia, \$893,000.

ILOILO SUGAR SHIPMENTS.

By José T. FIGUERAS, *General Broker, Iloilo.*

NOVEMBER.

[Crop 1909-10.]

Date	Vessel.	Destination.	Superior (piculs).
November 6	Kaifong	Hongkong	5,641
November 26	do	do	487
Total for November			6,128

DECEMBER.

[Crop 1909-10.]

December 19	Dakotah	San Francisco	18,400
December 29	Sungkiang	Hongkong	8,123
Total for December			26,523

Exports on December 31 for 1908 and 1909.

[In piculs.]

To—	1908-09 crop.		1909-10 crop.	
	Superior.	Wet.	Superior.	Wet.
United States			18,400	
China	43,791		14,251	
Japan	8,000	5,015		
Total	51,791	5,015	32,651	

HEMP STATISTICS.¹

EXPORTS, IN BALES, FOR NOVEMBER, 1909.

Date.	Vessel.	London.	Liverpool.	Atlantic, United States.	Pacific East and California.	Continent.	Australia.	Other ports.	Total bales.
1909.	Forward	224,121	111,198	549,027	110,190	50,277	15,481	26,684	1,086,958
Nov. 1	Yawata Maru	11,464	305			2,245	1,975		1,975
Nov. 5	Monmoutsing					5,020			14,014
Nov. 5	Loongsang				18,609				300
Nov. 9	Kumemio								5,020
Nov. 9	Indrasamnia								18,609
Nov. 9	Coblenz							125	125
Nov. 9	Taming								250
Nov. 10	Changsha								250
Nov. 11	Empire							400	400
Nov. 12	Yutengsang						19	150	169
Nov. 13	Zaffiro	2,650	1,000			600			8,700
Nov. 13	Sungkian (Cebu)		1,550						1,600
Nov. 17	Team		1,250			500			1,750
Nov. 18	Cyclops	8,147	400			1,700			10,247
Nov. 19	Loongsang					650			650
Nov. 20	Rubi								600
Nov. 20	Kumario Maru								120
Nov. 26	Yuengsang		1,208	140		458			1,796
Nov. 27	Zaffiro		1,059			836			500
Nov. 28	Ningchow				1,250				2,385
Nov. 23	Kaifong (Cebu)			750					1,950
Nov. 29	Nikko Maru							412	750
Nov. 30	Alicante					121			371
Total for November 1909		248,014	116,743	567,636	116,460	57,471	18,243	29,634	1,158,701

¹ From "The Far Eastern Review," Vol. VI, No. 7, December, 1909, and Vol. VI, No. 8, January, 1910.

EXPORT OF HEMP, DECEMBER, 1909.

Date.	Vessel.	London.	Liverpool.	Atlantic, United States.	Pacific West and California.	Conti- nent.	Australia.	Other ports.	Total bautes.
1909.	Forward	248,014	116,843	547,636	116,460	57,271	18,243	29,234	1,153,701
Dec. 1	Duffield		22,700			100			22,700
Dec. 3	Loongsang					250			100
Dec. 4	Rubi								1,650
Dec. 6	Cesar			1,600				800	1,600
Dec. 6	Prinz Waldemar							50	50
Dec. 7	Taming								200
Dec. 9	Indravengcy (Cebn)								200
Dec. 10	Ocean Monarch	10,400	2,337	29,675		850			29,675
Dec. 10	Yuensang					74			13,567
Dec. 11	Zaffiro								74
Dec. 11	Eastern								450
Dec. 13	Kation (Cebn)								90
Dec. 12	Kemirin	10,052	3,400			600			50
Dec. 14	Tean		200			300			50
Dec. 18	Aymereich								14,922
Dec. 18	Yawata Maru	87			3,361				900
Dec. 24	Antiochus				1,500				3,361
Dec. 24	Taming					650			218
Dec. 24	Yuengsang					344			1,500
Dec. 24	Ocean Monarch					550			675
Dec. 24	Zaffiro	9,245	3,225			550			369
Dec. 27	Indra			2,225					25
Dec. 27	Kumano Maru								25
Dec. 28	I. de Panay	250				200			980
Dec. 28	Tean					100			450
Dec. 29	Kaifon								275
Dec. 30	Loongsang	3,437	363			200			175
	Total	281,513	126,368	623,836	121,321	62,039	19,303	31,430	1,265,810

THE PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS FOR NOVEMBER AND DECEMBER, 1909.

[By the Collector of Customs.]

NOVEMBER, 1909.

IMPORTS.

Articles.	Units.	Manila.	Cebu.	Iloilo.	Jolo.	Zamboanga.	Balabac.	Davao.	Total.
Rice	Kilos	9,220	562	220,180	2,047,468	45,385	61,397	...	11,594,932
	Dollars	280	482	8,182	63,207	1,621	2,034	...	355,326
Beef cattle	Quantities	3	213	1,239	...	...	...	...	3,263
	Value	56	408	...	...	...	...	...	57,647
Hogs	Quantities	...	...	...	...	...	...	...	...
	Value	...	...	...	...	...	...	...	...
Sugar	Quantities	168	786	16,085	9,686	9,185	3,133	...	266,875
	Value	11	115	1,203	716	645	212	...	13,891
Coffee	Quantities	103	512	2,340	3,421	1,304	787	...	111,564
	Value	21	694	605	692	338	215	...	23,539
Cacao	Quantities	32	902	2,250	22	...	...	...	35,174
	Value	7	377	647	33	...	...	...	8,047
Eggs	Quantities	167	714	76	343	...	...	...	168,443
	Value	18	668	5	21	...	...	...	18,709
Raw cotton	Quantities	70	868	...	...	15	...	...	70,968
	Value	20	208	...	...	...	...	...	20,208

EXPORTS.

Hemp	Quantity --	Kilos	8,296	308	2,760	375		734		11,057,417
	Value --	Dollars	833,	448	288,	563		98		1,117,109
Sugar	Quantity --	Kilos	403	75			75			438,492
	Value --	Dollars	20,	746			45			20,811
Copra	Quantity --	Kilos	5,245	902			61,158			17,818,982
	Value --	Dollars	420,	204			32,185			1,337,837
Cigars	Quantity --	Kilos	16,808				4,459			2,549
	Value --	Dollars	273,	266			16,808			273,266
Cigarettes	Quantity --	Kilos	3,375							3,375
	Value --	Dollars	3,	356						3,356
All other tobacco	Quantity --	Kilos	1,047,	693						1,047,693
	Value --	Dollars	150,	866						150,866

DECEMBER, 1909.

IMPORTS.

IMPORTS.						
Rice	Dollars	415,821	190,758	24,563	1,508	6,552
	Kilos	12,917,152	6,357,450	862,337	49,648	182,451
Beef Cattle	Dollars	56,440	1,687	9,320		20,369,238
	Numbers	2,202	46	314		66,947
Hogs	Dollars	25,050				2,362
Eggs	Dollars	241,800				1
Sugar	Dollars	21,305	769	48	465	344,071
	Kilos	321,022	10,560	530	6,253	33,463
Coffee	Dollars	26,168	971	87	139	27,784
Cacao	Dollars	88,292	4,407	367	555	96,442
Raw cotton	Dollars	15,734				15,734
	Kilos	69,481				69,481
	Value					
	Quantity					

EXPORTS.

EXPORTS.						
Hemp	Dollars	884,513	476,941	846	400	1,352,700
	Kilos	8,808,243	4,612,569	6,874	676	3,428,562
Sugar	Dollars					97,352
	Value					
Corra	Dollars	777,100	173,000	1,716,569	1,636	1,718,264
	Kilos		2,028,257	8,483	7,804	968,328
Tobacco	Dollars	9,845,213	103,141	103,722	31,991	2,464,248
	Kilos	213,491			383,915	
Cigars	Dollars	1,045,312				1,045,012
	Value	276,682				276,682
Cigarettes	Dollars	16,915				16,915
	Thousands	2,589				2,589
	Dollars	2,302				2,302
	Thousands	2,302				
	Value					
	Quantity					

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

[By the Director of the Weather Bureau.]

NOVEMBER, 1909.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar.				Rice.				Tobacco.			
	Albay.		Tacloban.		Iloilo.		Tarlac.		Aparri.		San Fernando.					
	Temper- ature. °C.	Rainfall. mm.														
1.	27.4	2.3	26.8	5.1	27.0	3.3	27.4	0.0	26.0	1.0	27.0	0.0				
2.	27.0	0.0	26.0	6.5	26.6	0.0	27.4	0.0	26.3	0.0	26.8	0.0				
3.	26.7	32.3	26.2	8.9	26.4	0.8	27.6	0.0	26.2	0.0	26.8	0.0				
4.	26.7	1.5	26.3	3.6	26.6	0.3	27.6	0.0	26.4	0.0	26.8	0.0				
5.	28.1	51.6	25.5	61.6	25.3	22.1	26.8	0.0	26.0	16.0	27.4	0.0				
6.	26.0	53.0	(a)	62.2	24.7	130.7	27.6	11.2	25.2	41.7	26.6	0.0				
7.	27.4	0.0		3.3	25.3	43.2	24.9	38.4	25.3	27.0	26.0	15.2				
8.	27.6	1.5		41.4	26.2	4.1	27.8	37.1	25.5	23.4	27.1	0.0				
9.	26.8	4.5		0.5	26.0	6.1	28.0	12.4	25.4	3.3	27.8	10.9				
10.	27.0	61.5		2.8	26.0	19.0	26.8	0.0	26.6	0.0	26.6	8.1				
11.	26.5	67.6		7.9	26.0	0.0	26.4	6.6	26.1	18.5	27.0	3.0				
12.	27.1	5.7		0.0	26.2	4.3	26.8	0.0	25.8	0.0	26.8	0.0				
13.	25.9	18.3		45.0	25.6	9.4	26.7	0.0		5.1	25.8	0.0				
14.	25.0	85.1		53.6	24.9	4.7	26.8	2.5		6.9	26.0	0.5				
15.	26.3	11.0		0.0	26.4	5.3	25.2	12.2		91.1	26.1	0.8				
16.	26.5	4.6		0.0	25.3	30.0	27.8	0.0	25.7	1.8	26.8	21.8				
17.	26.6	14.8		0.0	26.0	6.4	27.4	6.4	26.0	2.0	28.1	0.0				
18.	26.0	0.0		1.3	26.0	26.5	26.4	21.6	26.1	110.6	28.4	0.0				
19.	26.8	0.0		19.1	26.4	6.9	26.0	0.0	24.2	91.2	27.1	0.0				
20.	26.8	0.0		0.0	26.4	0.0	26.4	0.0	24.7	49.5	26.2	0.0				
21.	26.8	0.0		0.0	26.3	9.4	26.7	0.0	25.4	0.0	26.3	0.0				
22.	27.0	0.5		0.0	27.0	16.8	27.2	0.0	26.2	0.0	27.2	22.9				
23.	27.0	2.8		0.0	27.0	0.3	27.4	0.0	26.6	0.0	26.6	0.0				
24.	27.1	1.6		1.3	27.1	0.0	28.4	8.1		60.0	26.7	0.0				
25.	27.5	16.5		4.0	26.6	9.9	27.8	0.0		1.6	26.0	0.0				
26.	26.4	26.7		17.0	26.4	0.0	25.0	0.0		0.0	25.4	0.0				
27.	24.5	18.1		6.8	24.4	19.0	26.4	0.0	24.7	0.0	25.5	0.0				
28.	24.7	42.5		9.4	26.0	0.0	26.3	0.0	25.0	29.3	26.4	0.0				
29.	26.0	22.8		2.5	26.5	0.0	27.5	11.9	23.4	6.8	27.2	0.0				
30.	25.2	19.3		6.1	26.9	1.3	25.8	0.0	23.8	14.6	26.4	0.0				

Temperature and rainfall for agricultural districts in the Philippines—Ctd.

DECEMBER, 1909.

Date.	Hemp.				Sugar				Rice				Tobacco.			
	Albay.		Tacloban.		Iloilo.		Tarlac.		Apparri.		San Fernando.					
	Tempera-ture. °C.	Rainfall. mm.														
1	24.6	58.2	26.8	7.1	25.4	25.2	26.3	11.0	26.7	26.3	26.9	104.3	25.7	26.2	24.3	25.6
2															2.3	25.8
3															0.5	26.0
4															4.3	25.3
5															2.0	25.3
6															0.5	24.2
7															3.6	24.2
8															1.5	24.2
9															58.6	24.0
10															32.8	26.1
11															5.6	26.7
12															25.6	2.5
13															33.8	25.6
14															7.1	26.2
15															115.5	25.6
16															26.4	25.5
17															10.1	25.8
18															5.6	25.7
19															24.6	
20															1.8	23.4
21															0.5	24.6
22															24.5	
23															0.5	25.6
24															23.6	
25															0.3	24.5
26															23.5	
27															3.5	25.5
28															1.5	
29															24.9	
30															24.0	
31															25.7	

^a The thermometers of this station were broken during the typhoon of November 6, 1909.

PERIODICALS IN THE LIBRARY OF THE BUREAU OF AGRICULTURE.

Everyone interested in the study of tropical agriculture is invited to visit the library and make use of these periodicals.

ENGLISH.

GENERAL.

Agricultural Bulletin of the Straits and Federated Malay States, Singapore.

The Queensland Agricultural Journal, Brisbane, Australia.

The Agricultural Gazette, Sydney, New South Wales.

Journal of the Department of Agriculture of Victoria, Melbourne, Australia.

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Hawaiian Forester and Agriculturist, Honolulu, Territory of Hawaii.

Tropical Agriculturist, Colombo, Ceylon.

The Agricultural Journal of India, Calcutta.

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Natal Agricultural Journal, Pietermaritzburg, Natal, South Africa.

Agricultural News, Bridgetown, Barbados.

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The West Indian Committee Circular, London.

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Southern Cultivator, Atlanta, Georgia.

Progressive Farmer, Raleigh, North Carolina.

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Farmer's Guide, Huntington, Indiana.

Kansas Farmer, Topeka, Kansas.

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The Feather, Washington, D. C.

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The Gardeners' Chronicle, London.

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 The Journal of Tropical Veterinary Science, Calcutta, India.
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REPORTS AND QUOTATIONS.

- Crop Reporter, by the Secretary of Agriculture, Washington, D. C.
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 Hemp Market Report, Landauer & Co., London.
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 Exporters and Importers Journal, Chicago, Illinois.
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 Ker & Co's. Price Current, Manila, Iloilo, and Cebu, P. I.
 Weekly Shipping Circular (Sugar), Jose T. Figueras, Iloilo, P. I.

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- Official Gazette, Manila, P. I.
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 Philippine Resources, Manila.
 Far Eastern Review, Manila, P. I.
 Philippine Journal of Science, Manila, P. I.
 Weather Bureau Bulletins, Manila, P. I.
 The Philippine Agricultural Review, Manila, P. I.

SPANISH.

- Boletin de la Cámara de Comercio Filipina, Manila, P. I.
 Revista Agrícola é Industrial, Manila.
 Boletin Oficial de la Secretaría de Agricultura, Comercio y Trabajo, Cuba.
 Boletin de Agricultura, San José, Costa Rica.
 Hacienda Mexicano, El, Mexico, Mexico.
 Hacienda, La, Buffalo, New York.
 Industrias Americanas, New York, N. Y.
 Revista del Ministerio de Obras Públicas, Bogotá, Colombia.
 Agricultor Peruano, El, Lima, Peru.
 Revista de la Asociación Rural del Uruguay, Montevideo.
 Prácticas Modernas é Industrias Rurales, La Coruña, Spain.
 Resumen de Agricultura, Barcelona, Spain.

OTHER LANGUAGES.

- Bulletin de la Chambre de Commerce de Saigon, Saigon, Indo-China.
 Bulletin Economique, Hanoi-Haiphong, Indo-China.
 Chamber d'Agriculture du Tonkin, Hanoi-Haiphong.
 Bulletin de Département de l'Agriculture aux Indes Neerlandaises, Java.
 L'Agronomie Tropicale, Brussels, Belgium.
 Boletim de Agricultura, Sao Paolo, Brazil.
 Tamil Journal of South India Agriculture, Madras, India.
 Station Agronomique, Port Louis, Colony of Mauritius.
 Journal d'Agriculture Tropicale, Paris.
 Boletim do Museu Goeldi, Para, Brazil.
 O Fazendeiro, Sao Paolo, Brazil.
 Boletim de Sociedade de Geographia de Lisboa, Portugal.

THE PUBLICATIONS OF THE BUREAU OF AGRICULTURE.

The following-named bulletins of the Bureau of Agriculture are available for distribution, and will be sent free of charge to any address upon application. Applicants are requested to state whether all publications of the Bureau are desired as issued, or only those specified. The name and address of the applicant should be plainly written and all communications should be addressed to the Director of Agriculture, Manila, Philippine Islands.

FARMERS' BULLETINS.

- No. 4. Preliminary Report on Commercial Fibers of the Philippines. (Spanish.)
- No. 6. Experimental Work with Fungous Diseases of Grasshoppers. (Spanish.)
- No. 9. A few Suggestions on the Cultivation of Cotton. (Spanish.)
- No. 11. The Jute Industry. (Spanish.)
- No. 12. Abacá. (Manila Hemp.) (English.)
- No. 13. The Cultivation of Maguey in the Philippine Islands. (English and Spanish.)
- No. 14. The Cultivation of Sesamum in the Philippine Islands. (Spanish.)
- No. 15. Tobacco Growing in the Philippines. (Spanish.)

PRESS BULLETINS.

- No. 6. The Tamarind. (English.)
- No. 8. Maguey; Propagating Abacá from Seed; etc. (English.)
- No. 9. Agricultural Districts; Control of Rinderpest, etc. (English.)
- No. 11. Seed Distribution; Need of Diversified Farming, etc. (English and Spanish.)

POPULAR BULLETINS.

- No. 1. Maguey. (English, Spanish, Visayan, Cebuano.)
- No. 2. Kapok. (English, Spanish, Tagalog, Visayan, Ilocano, Cebuano.)





PLATE I.—HON. CHARLES BURKE ELLIOTT, PRESIDENT PHILIPPINE CARNIVAL ASSOCIATION.

CARNIVAL NUMBER

THE PHILIPPINE *Agricultural Review*

VOL. III

MARCH, 1910

No. 3

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OFFICERS OF THE PHILIPPINE CARNIVAL ASSOCIATION.

PHILIPPINE CARNIVAL, FEBRUARY 21 TO 28, 1911.

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EDITORIAL.

THE PHILIPPINE CARNIVAL.

FOR HARMONY AND COÖPERATION.

The third Philippine Carnival has passed into history and we are glad to record that it was not only a success in carrying out the ideas for which the Carnival was instituted, but that the support given to it by the Filipino people and our neighbors in adjoining countries made it a financial success. The report of the secretary of the Carnival Association on February 25 shows that there is a cash balance on hand of ₱17,010.26; bills receivable to the amount of ₱7,785.23; property on hand conservatively valued at ₱11,889.14, and bills outstanding amounting to ₱749.50, which makes ₱35,935.40 the available capital of the Carnival Association for 1911.

The fundamental purpose of the Carnival is to build up a bond of sympathy and a feeling of good will among the people in the Far East. It is a good thing for us to forget, at least for a time, our personal, race, and national prejudices and devote ourselves to good cheer and the common good of all. This year, more than ever before, the Carnival demonstrated that it is not a Manila show, but that it is truly the Carnival of the whole Filipino people and their friends in neighboring countries. The first Carnival made Manila well known as an entertainer, the second Carnival spread the fame of the Philippines throughout the Orient, Europe, and the United States. Last year a number of foreign visitors were entertained, and this year Shanghai, Hongkong, Java, and Australia were well represented.

We are glad to meet and compete with our friends from Hongkong, Singapore, and other countries in the Far East, who are working to solve the same kind of problems as ourselves. The Carnival as an organization for promoting harmony and coöperation in the Far East deserves the support not only of all of the people in the Philippines but of every country in this part of the world. Netherlands India and Australia had creditable exhibits this year, and we hope that there will be much larger and more representative exhibits not only from these countries but also from China and the Federated Malay States at the Carnival of 1911.

ITS EDUCATIONAL VALUE.

No one who visits a fair or exposition can fail to be impressed with its educational value to the masses of the people. In the exhibit of the Bureau of Printing at the Carnival the linotype machine working side by side with the old method of typeset-

ting, and the machines for folding and binding printed matter into pamphlets and books, were striking examples of the immense advantage and value of modern machinery as compared with the old methods. The exhibit of the Bureau of Navigation was none the less interesting and edifying in that it presented to the people the great work which this Bureau is doing for improving interisland transportation and safeguarding in every way possible the products of the farms, shops, and factories when they have gone into the channels of trade and commerce. This exhibit further showed how this Bureau is endeavoring to encourage trade and commerce in all parts of the Islands, and to establish a complete system of port works at the principal commercial ports. The Bureaus of Internal Revenue and Public Works demonstrated by their exhibits at the Carnival something of the character and importance of the work which they are doing for the country. The exhibits of the Bureaus of Science and Forestry showed some of the many undeveloped and marvelous resources of the Islands. The exhibits of the Bureau of Agriculture and some of the provinces were a revelation to many in that they demonstrated possibilities in the way of growing different agricultural products that were believed to be impossible. The Bureau of Education was eminently successful, not only in showing some useful and handsome articles made in the schools but in its practical demonstrations.

A STIMULUS TO AGRICULTURE, MANUFACTURES, TRADE, AND COMMERCE.

One of the most important benefits of the Carnival is the stimulus which it gives to the industries of the people. The series of agricultural conferences held in connection with the Carnival resulted in bringing together a gathering of earnest and intelligent farmers from different sections of the country. The information and the ideas which these delegates obtained will be widely disseminated. The excellent exhibits of agricultural products, of pure-bred horses, cattle, hogs, and poultry have shown the people something of the possibilities of agriculture in this country. All of these factors will undoubtedly tend to encourage the development of our agricultural and other resources. The demonstrations made by the Bureau of Education, showing improved methods for manufacturing many Philippine products, should have very practical results both in increasing the total output and in improving the quality of our local manufactures. That trade and commerce, both interisland and that between these Islands and other countries, is stimulated by the Carnival can not be questioned. At the last Carnival special

credit is due the different Bureaus which furnished exhibits showing the work which they are doing for the country; still greater credit is due to the ten provinces which sent exhibits of their products.

The able management of the Carnival of 1911 is assured by the personnel of the Board of Directors. It is now time, therefore, to offer such suggestions as may seem desirable to further its success and to give our assistance to these men in every way possible. It is believed that the industrial features, which furnish the strongest argument for making an annual carnival a permanent institution, should be given more attention each year. In this connection it would seem desirable that the agricultural and commercial interests of the country be more largely represented on the board of directors than heretofore. The farmers, the manufacturers, and the merchants should know that their interests in the Carnival are being handled by their own representatives. It has been suggested that the provinces should be represented on the board of directors. One of the most difficult, and at the same time one of the most essential, factors in the ultimate success of our carnivals is a larger participation by the provinces, and any reasonable measures that will tend to encourage such participation should receive consideration.

It has also been suggested that the present plan for provincial exhibits tends to stir up provincial and sectional rivalry instead of rivalry between the individual farmers, growers, or manufacturers. Instead of a dozen or fifteen provincial buildings for the coming Carnival, it has been suggested that we have four or five large buildings for *agricultural, machinery, live stock, and commercial exhibits*, that the agricultural building be divided into departments for the exhibit of the leading agricultural products, such as fibers, sugar, coconuts, and tobacco. There should also be departments for general farm products, such as seeds and grains, vegetables, fruits, potted plants, flowers, etc.; a department for household industries, and a miscellaneous division. It is believed that there should be two or three prizes for the best exhibits in each department or division which should be given to the individual exhibitors, inasmuch as the ultimate end of all such exhibitions and prizes should be to develop and improve the work of the individual farmers, craftsmen, and manufacturers.

It would seem that one of the most important features of the Carnival exposition should be a well-filled machinery building for all kinds of machinery and that special demonstrations should be given daily showing the particular use and merits of each machine on exhibition.

THE INFLUENCE OF AGRICULTURE ON THE FUTURE OF THE PHILIPPINE ISLANDS.¹

By His Excellency, the Governor-General, WILLIAM CAMERON FORBES.

I have chosen as the subject of my address "The influence of agriculture on the future of the Philippines." As you know, agriculture is the basis of all prosperity, the fountain of all wealth; and in order that we may immediately attain the happiness we desire, we should provide that agriculture, through rapid development, may reach a flourishing condition. The word industry is more comprehensive, embracing more than the word agriculture; while it means the cultivation of the soil, it also includes the manufacture of its products, so that agriculture comes first, and manufacture follows it.

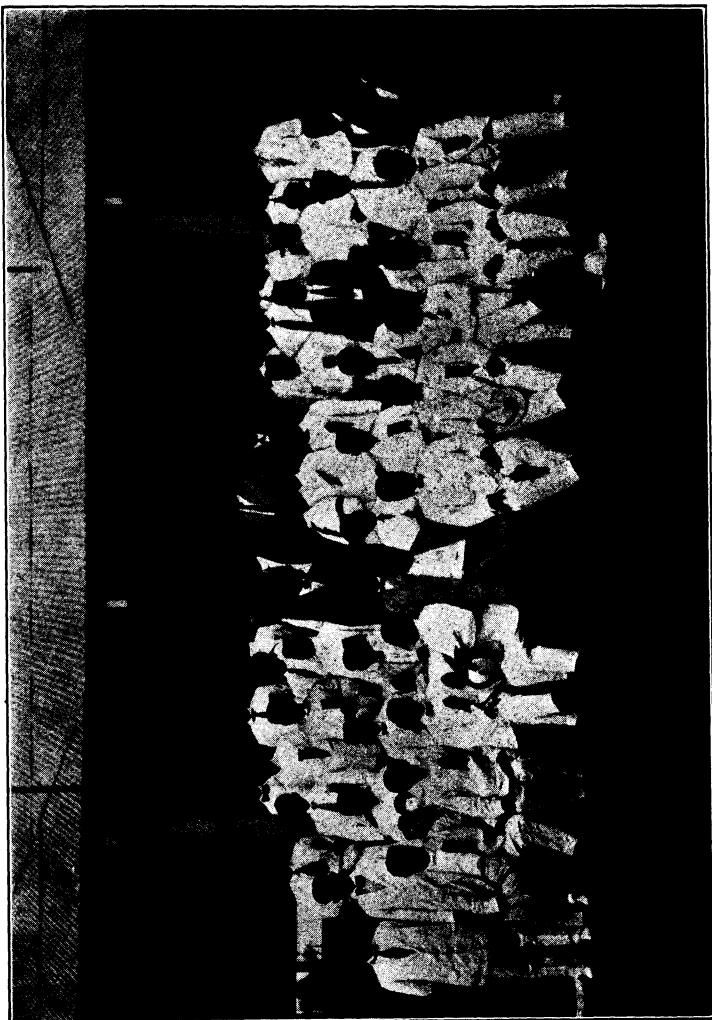
THE TENDENCY OF THE FILIPINO PEOPLE.

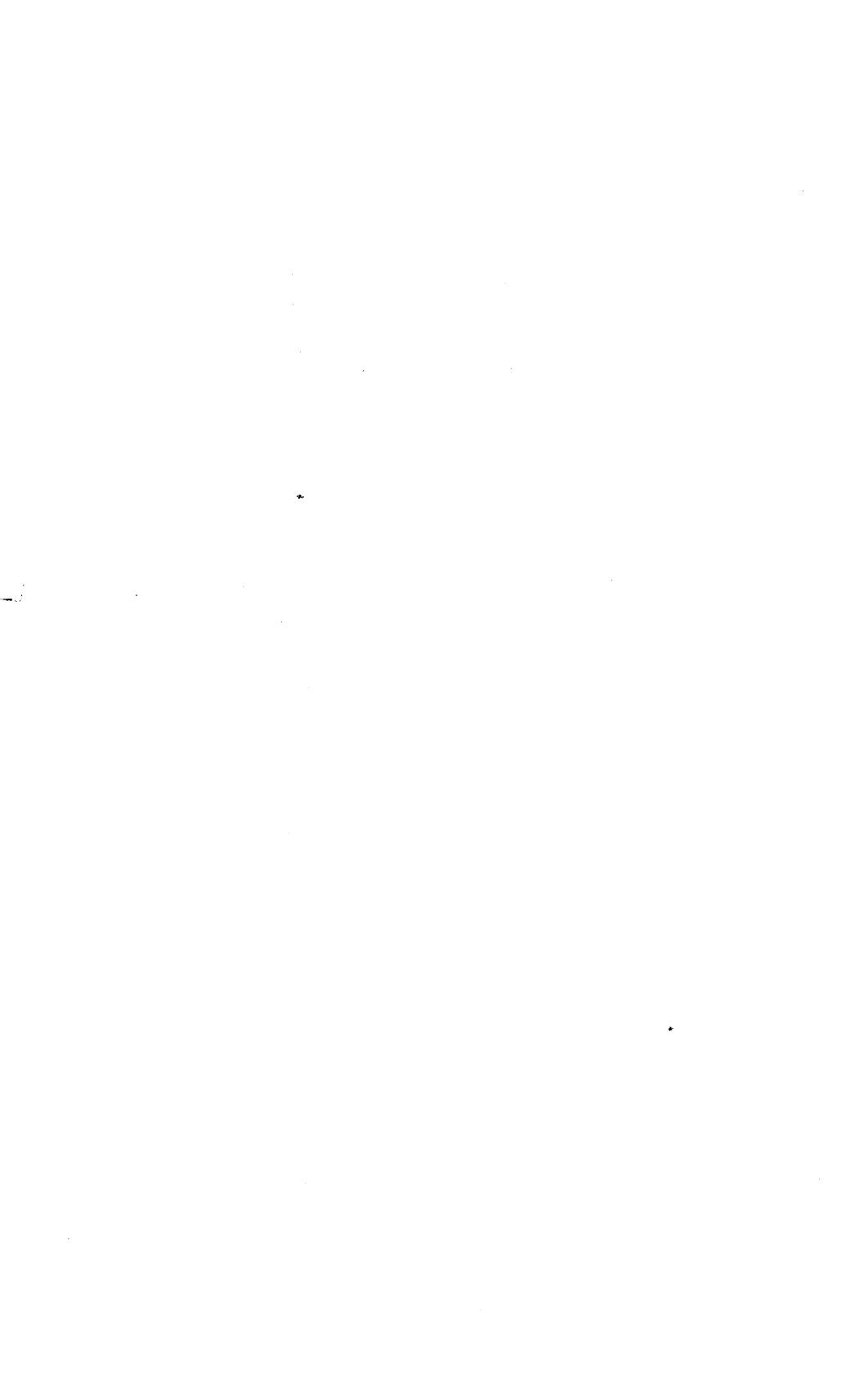
I notice with sorrow that the Filipinos are more interested in and devote themselves with more earnestness to manufacture. To confirm my assertion, I quote, as an example, the fact that there having been opened two schools, one for agriculture and another for fine arts, the applicants for admission to the former amounted to only the insignificant number of seven, while those to the latter numbered more than seven hundred, thus showing a widespread desire to begin with that which might better be postponed. It is a natural tendency in people to wish to devote themselves to the highest subjects, to the finest arts; and in this respect the Filipinos are no exception to the rule; but owing to the conditions which prevail in the Philippines, men of reputation, those who enjoy the privilege of influencing the country, should direct all their efforts and energies toward urging young men to lift up our prostrate agriculture.

The Filipino people wish to be independent, and to be so, in the true meaning of the word, it is necessary that they should

¹ Address delivered before the delegates to the Agricultural Conferences at the Philippine Carnival, February 7, 1910.

PLATE II.—DELEGATES TO THE AGRICULTURAL CONFERENCES.





devote themselves to the cultivation of the soil in order to obtain from it the products needed for their subsistence. The Philippine soil, fertile by nature, will not be unresponsive to their labor. This is a matter of the greatest importance in all countries that desire to enjoy independence. Observe them and you will see that when, owing to adversity, calamities, or other unforeseen causes, the soil does not produce sufficient food to maintain its inhabitants, commerce becomes paralyzed, and in order that the government may be preserved it tries immediately to remedy the critical situation, thus confirming the conclusion that the most vital factor in the existence of a country is agriculture.

PROGRESS MADE IN THE PHILIPPINES.

In the past few years the Filipino people have made great progress in the administration of justice. Public order is assured everywhere, public instruction is attended, and the Bureau of Health, fighting against diseases and pests which have broken out, has been able to almost entirely eradicate them—at present there is but little cholera.

We have also advanced in regard to public works; we are constructing our buildings and bridges with the best materials; and the administration of the Government—notwithstanding the severe criticisms of the press, which perhaps has not carefully studied the matter, and of the criticisms made by some public speakers who say we waste the money of the people—is very economical. Upon comparing the expenses of other countries and those of the Philippines, the comparison gives us a favorable balance, and I can assure you that, with the exception of education, for which we spend considerable sums of money, in other respects the taxes levied are smaller than those imposed upon the people in other countries, though they are richer and more prosperous than the Philippines. I expect that with your sound judgment, with your unprejudiced and just discernment, you will not give credit to the constant attacks directed against the Government—this being a subject almost necessary for those who, without any ascendancy nor authority over the people, want to appear as the most zealous defenders of their rights.

OUR DIFFICULTIES.

In spite of this substantial advancement in administration, in agriculture we have remained stationary. For this paralyzed condition the Government can not be reproached, because the Government does not devote itself to agriculture, but the people. The Government's duty is to see that the interests of the people are rightly administered and to let the people cultivate the soil,

and its only power in the matter is to find out the way of better giving its assistance to the people for the development of agriculture. I have studied the subject and found that *the first difficulty is the lack of draft animals* which have been so generally destroyed by rinderpest. This is the principal factor in the present stagnation of agriculture, and the duty of the Government, therefore, is to help the people in stamping out this disease in the Islands as well as it is the duty of the people to coöperate with the Government in this enterprise. The Government can not do it without the coöperation of the people, nor the people without the assistance of the Government; Government and people are elements which must necessarily work together if success is to crown their efforts. There is necessity of coöperation on the part of both, and when I speak of the Government, I refer not only to the Insular Government, but to the provincial and municipal governments also. I can assure you that I am ready to undertake a campaign against rinderpest. By an Act passed by the Philippine Legislature I am empowered to appropriate the money already appropriated for one object to another, and I have made use of this power to make the fight against rinderpest. Secretary Worcester has this matter under his direction, and I believe that the plan devised will be efficient. If you add your endeavors to those of the Government, I am sure that the black horizon of the past will in due time open and reveal the bright dawn which will light a prosperous and happy future.

If I ought on the one hand to give you the hope of economic welfare, on the other it is my duty to let you have a glimpse of the evils which oppose its speedy and full realization. These are *the lack of titles to lands, and the obstinate and persistent refusal of landlords to construct permanent buildings and introduce any improvements on their estates* if they do not see that these will give great and sure benefits. Regarding the first point, there are many persons who, while in possession of lands, have no title whatever to guarantee their ownership. And what happens then? If they are in need of money to buy work animals or implements with which to cultivate their fields, they can not obtain it from their lands as they have no titles to prove their right of possession. This difficulty is a very great one, which I hope you will try to overcome by every means possible. Concerning the second point, I have nothing to tell you, for you are well aware as to what improvements are being made in your respective provinces.

As I passed through Egypt during my last trip to America, I ascertained the value of lands in that country, which sometimes

reaches \$800 an acre. Each small parcel of land is under a legal title. There is an Agricultural Bank which loans money in large and small sums, and all of this has caused agriculture, in a few years, to attain a wonderful development. The landlords have their land surveyed, their boundaries are well defined by landmarks, and everyone knows the part to which he is entitled in each lot of land.

This is what is most needed here, and I do not doubt that you will be able to overcome the difficulties in the way. According to our calculations it seems that more than 70 per cent of the titles in this country are wrong, owing to the mistakes of the surveyors under the former government, which did not care to guarantee the accuracy of the measurements as is now done. I have had the opportunity to examine some of these plans, and found that in many of them the starting point is not well specified; sometimes the differences, on this account, are as great as 15 meters, which is not only troublesome for the owner of the measured lands, but also for the owners of the adjoining lots. I understand very well that this matter is a very delicate and difficult one, and this is the reason why your most serious endeavors must be bent on securing the greatest possible accuracy in the measurements. It is true that we have a court of land registration; but, in spite of it, the issue of titles goes very slowly, owing chiefly to the difficulties which come from settling these matters in the courts.

Everyone is concerned that the plans be correct, and especially the people who pay the taxes, for, if the Government accepts a plan which is not well made and guarantees a title which ought not to exist, the Government has to pay the expenses which may follow, thus damaging the taxpayers who sustain the weight of the taxes. Therefore, it is necessary that all of us should make every effort to see that our plans are correctly made, in order to avoid lawsuits which may present themselves in the future.

STEPS NECESSARY FOR THE DEVELOPMENT OF AGRICULTURE.

In my inaugural address, and in the one recently delivered at the convention of provincial governors, I placed a great deal of emphasis on these four great problems: *rinderpest*, *locusts*, *roads*, and *titles*. I do not mean by this that the great problems of the Philippines are reduced to the four subjects spoken of; my only intention is to mark the greatest needs to which the public officials must give their attention. But I was wrong in stating that I insisted only on these four points; *I have also*

called attention to the necessity of giving an impulse to agriculture.

I do not wish to weary you by dwelling upon the necessity of killing the locusts and keeping the roads in good condition. Concerning the first point, I do not doubt that the people, seeing the advantage, will work for their complete suppression; the Government has only to attend to the second point, for, though the people are most concerned, this work is more especially the duty of those who direct and have the reins of government in their hands. I gladly take this opportunity of stating here that the provincial governments respond to this need: I must not insist any more, and I am going to assure you that I am for the conservation and improvement of roads, which constitute one of the most powerful supports of agriculture. I confidently hope that the provincial governments, which have this matter in their hands, will not spare any effort but will earnestly work for these improvements.

If I may try your patience a little further, I wish to say something on *irrigation*. It is not necessary for me to explain to you its importance, which you know very well. The Philippine Legislature has passed a law to facilitate the construction of irrigation systems; and engineers have already been sent to several provinces of the Archipelago to study this matter on the ground. After one year of work they submitted their report, and I have furnished them, in the form prescribed by the Legislature, the necessary money to begin the work. Irrigation systems are being constructed at Iloilo, Pangasinan, Tarlac, Rizal, and Leyte, and I think that we should not stop until irrigation works are established in all the provinces. Those who so far have not received the benefit of irrigation can not complain because we spend in certain provinces the money collected in the others, for the expense of these works will be reimbursed with the money which will be required in payment for the water distributed, giving preference to the regions where irrigation works can be established at the least expense.

I have just submitted for your consideration the more important subjects affecting the economic improvement of the Philippines, but inasmuch as material prosperity does not include everything, I am going, with your permission, to mention something related to the uses and customs of the Filipino people. It is beyond doubt that the *general health* is in proportion to the health of individuals, and, this being so, in order that the Filipino people may support without undue effort the hard labor of tilling the ground, it is necessary for them to attend also

to the natural requirements of the body for its better growth and development. I do not mean that poor people who do not possess any means should aspire to delicacies and a scale of living which they could not sustain, but that, conforming with their means, they should live with all necessary cleanliness and decency. We must, in the first place, adopt measures to induce the people to part with the ugly and pernicious habit of taking the food with the fingers, which is the origin of many diseases that could be avoided by merely guarding in this way against contagion.

Concerning water, one of the most powerful propagators of the epidemic diseases which frequently afflict us, several artesian wells have been dug, and more are being constructed, to obtain a pure supply, and owing to them the mortality in the Islands has greatly decreased. If, having attended to this vital necessity of man, you contribute your efficient help toward lifting up agriculture from the prostrate condition in which it now lies and, as a consequence of it, the better feeding of the people who work, which will bring a rise in salaries, you will have built not only your own welfare, but also, what is more meritorious, the welfare of your countrymen.

THE NETHERLANDS INDIAN EXHIBIT AT THE CARNIVAL.

By Hon. P. K. A. MEERKAMP VAN EMBDEN,
Consul for the Netherlands.

The Java exhibit at the Carnival which was obtained through the efforts of the Netherlands consulate in this city, was taken up by the Netherlands Indian government, which asked the Society East and West in Batavia to prepare and send to Manila a suitable exhibit of the native industries of Java to represent Netherlands India at the Philippine Carnival.

The Society East and West in Batavia is an association organized for the purpose of promoting native industries. It was noted and commented on by many visitors to the Carnival that the Java exhibit did not represent the larger industries for which the Dutch East Indies are famous the world over. Doubtless many visitors were disappointed that they saw nothing of the products from the great tobacco, coffee, or tea plantations on Java and Sumatra, and none of the spices for which some of these islands have been famous for many years. The exhibit, as stated, consisted solely of products of the smaller industries of the native people of Java and the other islands, such as samples of Javanese cloths, work in metals, wood carving, and articles made from the skins of snakes.

The exhibit of native cloths consisted principally of *batteks*, native cotton cloths made into sarongs in Samarang, Sourabaya, and other towns of Java, Sumatra, and nearly all of the larger islands. The sarong, or skirt, formerly worn by men and women alike, but now only rarely by men, is a strip of cotton about 2 meters long and 1 meter wide, which is drawn tightly around the hips, the fullness gathered in front, and by an adroit twist made so firm that a belt is not necessary to native wearers. The coloring of these cloths is a very interesting and complicated process which it is believed is used solely by the Javanese. Men and women painting these cloths, trace a first outline in a rich brown

waxy dye, which is the foundation and dominant color in all batteks. The parts which are to be left white are covered with wax, and the cloth is dipped in or brushed over with the dye. This resist or mordant must be applied for each color and the wax afterwards steamed out in hot water, so that a single sarong goes through many processes and handlings, and is often the work of weeks. The dyes are applied hot through a little tin funnel of an implement tapering down to a thin point, which is used like a painter's brush, but will give the fine line-and-dot work of a pen-and-ink drawing. The value of a sarong depends upon the fineness of the drawing, the elaborateness of the design, and the number of colors employed. Beginning as low as two pesos, brilliant cotton, or hand-painted calico sarongs, increase in price to forty or sixty pesos. In addition to these cloths, there were some cloths and garments made by the Achinese, who live in the northwest extremity of Sumatra. This exhibit included a fancy cushion made in Sumatra and a shawl made in Dutch Borneo.

The exhibit of Javanese metal work was quite complete and contained samples of vases, bowls, and numerous other articles made of copper which came from Sourabaya. Beside the work in copper, there were many excellent specimens of cigar and cigarette holders made of pure tin which came from the Island of Billiton, also samples of brass and other ornamental articles. There were some very interesting specimens of useful and ornamental articles made of silver by the native silversmiths of Buitenzorg. The Javanese are quite adept in these arts, and in many respects it was noted that their work, while it showed the effects of Buddhistic religious influence and some evidences of European environment, was of much the same character and grade of workmanship as that done in many parts of the Philippines. Beside these, there were also some specimens of brass work done by the natives of Borneo which very much resembled the Moro brass which was on exhibit from the Moro Province.

Another feature of this exhibit which closely resembled work done in the Philippines was the samples of paper knives, spoons, penholders, etc., made from the horns of the carabao or water buffalo.

The wood carving exhibit indicated perhaps a greater development of this industry by the Javanese than has been made by the people of the Philippine Islands. The samples of wood carving consisted very largely of images and ornamental pieces which were very interesting to students of anthropology and curio hunters.

There were also a number of samples of what are commonly known as *petacas*, or cigar and cigarette cases, which were made of nito, buri, and various grass fibers. These little cases were cheap and were all sold during the first two or three days of the exhibit. In this part of the exhibit there were a few Javanese hats made of similar materials, which sell in Java for 15 cents Javanese money or about 12 centavos Philippine currency. As to what stage the art of making these hats has been developed in Java we have been unable to learn, but it is very apparent that labor is not so expensive in Java as in the Philippines and that grade for grade the Javanese hats sell for about one-half the price obtained for Philippine hats.

One of the most unique and interesting features of this exhibit, which represented a fairly well-developed industry in Java, was the exhibit of articles made of snake skins, such as ladies' belts, purses, card cases, and a great variety of similar articles which attracted a great deal of attention on the part of visitors to the exhibit. This industry is quite prosperous in Java, and the articles made from the skins of different reptiles are not only very attractive but the art of tanning these skins has been so developed that articles made from them are found to be durable and satisfactory souvenirs of a most interesting industry which is carried on in but few parts of the world.

It is hoped that for the Carnival of 1911 it will be possible to interest the Javanese government in sending an exhibit of the larger and more important industries of the country from the old plantations about Buitenzorg, and from the great tobacco, sugar, and coffee estates. Such an exhibit would not only be of great interest to the large hacenderos of the Philippines but would advertise these plantations and their products throughout the Far East.

We see no reason why such an exhibit as was made at the agricultural exhibition at Medan, Sumatra, in August, 1908, can not be made at the coming Carnival. At that exhibition different kinds of tobacco plants were shown; the director of the agricultural experiment station showed a complete series of plants under glass cases affected by diseases which prey on tobacco, together with an exhibit of the insect enemies of the tobacco plant in their various stages, all neatly set up in glass cases, easy to inspect and study. To supplement these exhibits, there were huge photographs which illustrated different phases of tobacco culture. Not less interesting were samples of tobacco soils from different parts of Sumatra, Deli, Langkat, Serdang, and other places, also a complete equipment of apparatus for the

analysis of soils. Such an exhibit would serve to give many people outside of Java who are consumers of Sumatra tobacco an adequate idea of the tobacco industry in the Dutch East Indies which would naturally add to the interest as well as the sale of the Sumatra product. Such an exhibit would not only be interesting but edifying to everyone in the Far East who is interested in the tobacco-growing business. More than this, Java's large estates or plantations devoted exclusively to the sugar-cane, coffee, and tea industries have reached a high stage of development. Exhibits showing the varieties of plants grown and the methods of cultivation on these plantations would attract visitors not only from the Far East but more or less from all parts of the world.

Beside these industries, Java is noted for its spices, and several of the islands, designated the Spice Islands, furnish a large part of the nutmegs, cinnamon, cloves, and pepper to the markets of the world. An exhibit of such products would attract attention to these industries of the Dutch East Indies of which little is known at the present time. The Botanical Garden at Buitenzorg could furnish an exhibit which, if adequately representing the great scientific work which has been accomplished at that place, would be a lesson to the world. Netherlands India with the Federated Malay States, Ceylon, parts of the China Coast, and the Philippines constitute one great field of tropical agriculture in which the conditions are very much the same; and these countries should coöperate with one another in solving their common problems. It is sincerely to be hoped that at the coming Carnival Netherlands India will be represented by an exhibit which will do credit to her industry, progress, and commercial importance.

THE QUEENSLAND EXHIBIT AT THE CARNIVAL.

By Dr. GERALD MCKAY,
Assistant Director-General.

Until last October very little had been done toward securing an exhibit of Australian products at the Carnival. About the first of October the writer was appointed an assistant director-general of the Philippine Carnival Association and very soon after left for Australia, where he interviewed the different heads of the governments of Queensland, New South Wales, and Victoria with reference to sending an exhibit to the Carnival. Owing to the coal strike, which was at its height at this time, it was impossible for the Australian officials to get together a satisfactory exhibit, especially at such a late date. It is well known to those familiar with exposition work that it takes months to get together a representative exhibit for such purposes in a home country, but when it takes three weeks to transport these goods to the exposition, which is the time required from Australia to Manila, much more time is necessary. The collection of Queensland products exhibited were gathered in Brisbane under the direct supervision of Mr. J. Scriviner, Under Secretary of Agriculture for Queensland.

The exhibit consisted of specimens of cereals, tobacco, sugar cane, flax, fibers, coffee, and pictures of farm life in Queensland. In addition to the Queensland exhibit, ten horses, a number of fine dogs, and a good collection of poultry were brought from Sydney. There were about ten Australian visitors to the Carnival, one of whom, Mr. Carl Zoeller, was placed in charge of the Queensland exhibit.

Six of the ten horses were prize winners at the horse show. During the show one pair of the grays was sold at ₱2,000, and the buyer has since sold them at a good profit. Another of these horses was a fine jumper, for which ₱600 was refused at the horse show, and a pacing pony from Melbourne, for which ₱500 was offered.

At the dog show the Australian exhibits figured prominently. Amongst these was the first-prize bull dog Arguide of Mr. Charles A. McDonough, the first-prize bull pup of Mr. B. F. Rahmeyer, Mr. John Kennedy's three prize Airdale dogs, Mr. J. M. Marker's cocker spaniels, and two bull bitch pups which took first prize were later sold for ₱305.

At the poultry show there were several Australian exhibits, consisting of Silver-laced Wyandots, Buff Orpingtons, Indian game chickens, and Bantams. This poultry came from the prize poultry farm of New South Wales known as "Martin's Paramatta Poultry Farm."

It is believed that it will be a very easy matter to secure a representative exhibit from Queensland, New South Wales, and Victoria for the 1911 Carnival providing the matter is taken up in time to allow the officials or committees in these States to get satisfactory exhibits together and ship them to Manila. There is every reason to believe that the Australian officials, who have manifested a great deal of interest in Philippine affairs, would make strong exhibits of horses, dairy cattle, and dogs; also a good exhibit of canned goods, such as meats, butter, and vegetables, in which products Australia already enjoys a large share of our trade. In addition to these there could doubtless be obtained an exhibit of grains and different kinds of feed for horses and cattle, also an exhibit of Australian coal. There would be no question about getting quite a number of Australians to visit the next Carnival if a trip were arranged.

It is suggested that steps be taken through the English consul or Australian representative in Manila to have a committee appointed in each State, composed of exporters of Australian products to the Philippines and the officials of the department of agriculture, for the purpose of preparing a representative exhibit of Australian products for the next Carnival.

THE INSULAR AGRICULTURAL ASSOCIATION.

By E. A. CODDINGTON,
Secretary of the Association.

The first Agricultural Conferences at the Philippine Carnival, which were held under the auspices of the Bureau of Agriculture, February 7 to 12, inclusive, were one of the most marked successes of any department of this year's Carnival. These conferences were attended by seventy-three delegates from twenty-two provinces, the College of Agriculture, and the Philippine Normal School. The number of delegates from the different provinces were as follows:

Rizal	9	Sorsogon	6
Laguna	7	Leyte	4
Cavite	1	Cebu	2
Bataan	2	Oriental Negros	2
Bulacan	5	Occidental Negros	2
Pampanga	6	Iloilo	1
Nueva Ecija	2	Misamis	2
Tarlac	2	Bohol	1
Pangasinan	3	College of Agriculture	5
Union	1	Normal School	1
Ilocos Norte	2	At large	3
Batangas	3		
Tayabas	1	Total number of delegates..	73
Albay	1		

During these conferences the following programme was carried out in full:

MONDAY, FEBRUARY 7.

8 a. m.—Music by the Cornell Sextet.

8.10 a. m.—Roll call by provinces.

8.20 a. m.—Recitation, "Regulus to the Carthaginians," by Mr. Manuel Roxas.

8.30 a. m.—Address by His Excellency, the Governor-General.

9 a. m.—Music by the Philippine Glee Club.

9.10 a. m.—Address by the honorable, the Secretary of the Interior, "What We Should Do for the Development of Agriculture in the Philippines."

PLATE III.—RICE EXHIBIT OF THE BUREAU OF AGRICULTURE.



9.50 a. m.—Music by Normal School Chorus.

10 a. m.—Address by the honorable, the Secretary of Public Instruction, "Industrial Education."

Intermission.

10.50 a. m.—Music by Normal School Chorus.

11 a. m.—Address by the Hon. Rafael Palma, "The Need of Farmers' Associations and What They Should Do for the Development of Agriculture."

11.30 a. m.—Music by Normal School Octette.

11.40 a. m.—Address by the Director of Agriculture.

Announcements.

2.30 p. m.—Music by the Cornell Sextet.

2.45 p. m.—"The Problems of the General Farmer in the Philippines," by Dr. G. E. Nesom.

General discussion.

"Animal Industry in the Philippines," by Dr. F. C. Gearhart.

General discussion.

Question box.

TUESDAY, FEBRUARY 8.

8.30 a. m.—"The Fiber Industry," by Mr. M. M. Saleeby.

General discussion.

"Rice Growing in the Philippines," by Mr. Silverio Apostol.

General discussion.

Question box.

2.30 p. m.—"Sugar Production in the Philippines," by Dr. Paul C. Freer, and Mr. P. A. Prentiss.

General discussion.

"Tobacco Growing in the Philippines," by Mr. John S. Hord.

General discussion.

Question box.

WEDNESDAY, FEBRUARY 9.

8.30 a. m.—"Coconut Growing in the Philippines," by Mr. Manuel Roxas.

General discussion.

"Varieties of Rice Grown in the Philippines," by Mr. Victorino Borja.

General discussion.

Question box.

2.30 p. m.—"Sugar-cane Growing in Hawaii and the United States," by Dr. G. E. Nesom.

General discussion.

"Maguey Growing in the Philippines," by Mr. M. M. Saleeby.

General discussion.

"Corn Growing in the Philippines," by Mr. Harold Cuzner.

General discussion.

Question box.

THURSDAY, FEBRUARY 10.

8.30 a. m.—"The College of Agriculture," by Mr. Toribio N. Vibar.

General discussion.

"School Gardening in the Philippines," by Mr. S. C. Kelleher and Mr. North H. Foreman.

General discussion.

10 a. m.—The organization of an Insular Agricultural Association.

The object of these conferences as set forth in the above programme was to discuss with the farmers their principal problems, but more especially those with reference to the best varieties of seeds and plants to be used in this country, methods of cultivation, and the manner of harvesting and preparing crops for market.

In addition to this, the purpose of the conferences was to get the representative farmers from different parts of the country together, to get them acquainted with one another and to stimulate personal discussion of their own interests—to build up a bond of sympathy between the different farmers of the Islands for the purpose of protecting their interests; to show them the most modern machinery for use on Philippine farms; to demonstrate to them modern methods of farming and stock raising by visiting the stations and farms of the Bureau of Agriculture adjacent to Manila; in general to bring about the greatest coöperation possible between the farmers and the Bureau of Agriculture, and on the part of the Bureau of Agriculture and the Government to give the greatest possible encouragement and assistance to all farmers who show a desire to improve the present methods of agriculture in the country and to secure the best results from their farms.

At the conclusion of the conferences the delegates present proceeded to the organization of an Insular Agricultural Association for the Philippine Islands, at which time the following officers were elected:

President.—Dr. G. E. Nesom, Director of Agriculture.

First vice-president.—Prof. C. M. Conner, Assistant Director of Agriculture.

Secretary.—Mr. E. A. Coddington, Superintendent of Publications, Bureau of Agriculture.

Vice-presidents.—Mr. Ismael Amado, Rizal; Mr. Manuel de Leon, Tarlac; Dr. Francisco Liongson, Pampanga; Mr. Ramon Reynado, Pangasinan; Mr. Florentino Rallos, Cebu; Mr. Esteban de la Rama, Iloilo; Mr. Vicente Diaz, Leyte; Mr. Cipriano Lopez, Batangas; Mr. Jose Figueroa, Sorsogon; Mr. Julio Ageaoili, Ilocos Norte; Mr. Felino Cajucom, Nueva Ecija; Mr. Mariano Crisostomo, Bulacan; Mr. Antonio Yazon, Bataan; Mr. Pedro Perlas, Laguna; Mr. Salvador Rodriguez, Bohol; Mr. Engracio Orense, Albay.

It was voted that provinces not already represented and having provincial agricultural associations be requested to elect a vice-president for the Insular Agricultural Association to represent them in the association. The president and secretary elect were instructed to prepare a constitution and by-laws for the association and submit the same to the vice-presidents for their recommendations.

The work of the association will, in a general way, follow the work already outlined by the first conferences and continue, as above stated, not only to carry out the work of the Insular Agricultural Association but will have as its final purpose the carrying on of the same work on a smaller scale through the organization of provincial and municipal agricultural and industrial associations of a similar nature in the towns and provinces.

On Wednesday afternoon a large number of delegates accompanied by the Assistant Director of Agriculture visited the forage factory and quarantine station located at Pandacan, in Manila, which is one of the largest and best equipped stations of its kind in the Far East. The site of the Manila Quarantine Station includes the forage factory, the twelve buildings of the quarantine station—sheds for the quarantine of live stock and hospitals for sick animals—also the three buildings of the College of Veterinary Science, which is one of the colleges of the University of the Philippines. At the quarantine station the delegates examined the machinery of the forage factory, which was in operation, and inspected the quarantine and hospital buildings, also the newly constructed buildings of the veterinary college.

On Thursday afternoon, a large number of delegates, accompanied by the Director of Agriculture, were conducted by Mr. William Smith, of the Luzon Sugar Refining Company, Limited, on the street cars to Malabon, where they were met by a large *banca* decorated with carnival colors and rowed across the river to the sugar refinery of the company, which is located in the town of Navotas. At the refinery the delegates were met by Mr. John Galbreath, manager of the refinery, who showed the visitors every possible courtesy in explaining the work of the refinery. Many of the delegates expressed themselves as greatly pleased with the high grade of sugar which is turned out by the Luzon Sugar Refinery, which, it might be noted, supplies the larger part of the local demand for consumption in the Philippines.

On Friday morning, undismayed by the rain, a number of delegates, including Sr. Miguel Malvar, of Batangas, accompanied by the Director of Agriculture, left the Paco Station at 7 a. m. for the serum laboratory and Alabang stock farm at Alabang, Rizal, about 15 kilometers from Manila. At the laboratory, the delegates witnessed a demonstration of the manner of producing serum, also inspected the serum herd and other animals at the stock farm. After a luncheon with the superintendent of the farm they returned to Manila at 2 p. m. and

visited some of the leading cigar and cigarette factories of the city.

There is every reason to believe that the next meeting of the Insular Agricultural Association, which will probably be held during the next Carnival, will be the largest assembly of the kind ever held in the Philippine Islands.

INSULAR EXHIBITS AT THE CARNIVAL.¹

BUREAU OF AGRICULTURE.

The exhibit made by the Bureau of Agriculture at the 1910 Philippine Carnival included agricultural products, tools, and implements, photographs, maps, charts, and publications.

An exceptionally fine showing was made of Philippine fibers, Manila hemp (*abacá*), the first export product of the Philippine Islands, occupying the most prominent place in this section. A collection of ninety samples of *abacá* from the district of Davao, Mindanao, was so arranged as to show the quality of the leading varieties of fiber produced in this district, and the commercial grades obtained from each variety. Commercial samples of *abacá* from Negros, Antique, Capiz, and other provinces, miniature bales of fiber showing different commercial grades, fiber prepared for making textile fabrics, different grades of cloth, cordage, hemp harness, and other materials made from *abacá* were included in this collection. In connection with the fiber exhibit two different *abacá*-cleaning machines were in operation on the Carnival grounds, both of which attracted a great deal of attention.

Maguey was represented by a handsome exhibit of machine-cleaned fiber from Cebu, hand-cleaned from Ilocos Norte, and maguey cloth from the Island of Panay. Kapok (tree cotton), which is widely distributed throughout the Islands and is a very valuable material for stuffing and filling, was shown both in the raw state and in the form of pillows and mattresses. Pineapple fiber (*piña*), used for making the celebrated *piña* cloth, was represented by excellent samples of fiber and various grades of cloth. White and brown cotton from Cebu and Ilocos Norte, cabó negro, buri, anabo, banana, sansaveria, and other fibers of minor importance were in this exhibit, which also included an excellent collection of hats, mats, baskets, and various other articles made from Philippine fibers.

The major part of the rice exhibit was made up of about 150

¹ Compiled from data furnished by the various exhibiting Bureaus.

varieties of rice grown at the Alabang stock farm of the Bureau of Agriculture during the past year. These varieties were shown both in the ear and in the grain, each species being accompanied by a card giving exhaustive data regarding the variety. This collection furnished an excellent opportunity for rice growers to study the qualities and relative value of the different varieties of rice.

Corn, the importance and extensive cultivation of which in the Philippine Islands are not generally understood, was shown in the white, yellow, and red varieties, both in the ear and grain. An attractive and instructive part of this exhibit was a sample of corn on the stalk, ear and grain, and also corn meal and corn bread, all of which were produced on a farm in the Province of La Laguna.

Of special interest to sugar growers were the models of sugar-making machinery sent to Manila by the China Sugar Refinery, of Hongkong, and through the courtesy of their agents in Manila, Messrs. Smith, Bell & Co., included in the Bureau of Agriculture sugar exhibit. Together with these models were shown samples of different grades of sugar and other sugar products. The collection of canes included a number of varieties from Occidental Negros and an exceptionally large and handsome variety from the Province of Pampanga.

The exhibit of coconuts and coconut products was limited only by the space available. Many varieties of nuts from the leading coconut-producing provinces, commercial samples of copra, oil, numerous articles made from coconut shells, and implements used in harvesting the nuts were included.

Tobacco from both the Cagayan Valley and from the Island of Panay was displayed. The excellence of the tobacco from Panay was particularly noticeable. A number of pots containing growing tobacco plants formed an interesting part of this exhibit.

Coffee showing the berries on the branch, also the product in sacks ready for the roaster, was displayed in considerable variety. Cacao was shown both in the pods and the commercial form.

The exhibit of forage plants and forage products included growing plants of guinea grass, para grass and teosinte, sheaves of sorghum, and millet, and sacks of dried forage from the forage factory of the Bureau of Agriculture at Pandacan.

Vegetables and fruits, both fresh and preserved, were shown in considerable variety, although conditions were not favorable for a large display. A shipment of fresh vegetables and fruits from the experiment station at Trinidad, Benguet, was received daily during the Carnival.

Among the miscellaneous products included in the agricultural exhibit were a large assortment of seeds, both local and imported, a collection loaned by the Philippine School of Commerce, and plows, cultivators, corn planters, and other agricultural implements furnished by Messrs. Castle Brothers-Wolf & Sons.

An instructive part of the exhibit was a series of 250 photographs showing various lines of agricultural work, and the more important agricultural products of the Islands. These photographs were supplemented by a series of outline maps, charts, and statistical tables, showing the relative production of staple crops throughout the Philippine Islands. Complete sets of THE PHILIPPINE AGRICULTURAL REVIEW, bulletins of the Bureau, and considerable printed matter from the United States Department of Agriculture were shown and a large number of copies distributed.

BUREAU OF FORESTRY.

The object of installing a forestry exhibit at the Carnival was to give visitors, foreigners as well as residents of the Islands, some idea both of the vast variety and of the great bulk of Philippine forest products. The first object was attained by showing, as far as space permitted, a large variety of Philippine woods, of manufactured articles and of minor products. An attempt was made to convey some notion of the quantity of timber in the Islands by means of forest maps and of special exhibits, both inside and outside of the building, of woods of the Lauan family, or Dipterocarps, accompanied by statistical placards.

The entire base of the interior walls of the exhibit was lined with a series of more than a hundred log specimens, of about 70 or 80 species, labeled with scientific names and the common names in the islands or provinces from which they were collected. From the tops of these logs up to the eaves, the entire walls were lined with a series of over seventy 3-meter planks, polished and unpolished, showing about forty species of woods, principally of kinds well known in commerce. The species represented by these logs and planks together—about 100 in number—amount to only about one twenty-fifth of the known tree species of the Islands.

Of manufactured wood products, there was a good assortment of narra, tanguile, and other furniture, loaned by various firms and individuals, as well as various one-piece table tops and other articles belonging to the Bureau of Forestry. Some of these were unfinished, some polished in natural colors, and others finished in various stains.

The collection of minor forest products included such articles as copal resin, gutta-percha, rattans, bamboos, hagnaya, brooms, dye bark, soap bark, etc.

The front entrance of the building was a great gateway formed of heavy timbers and rough palm logs, surmounted by a huge illuminated sign of bamboo letters mounted on a single piece of ipil 1 meter wide by 8 meters long. The entrance was flanked on both sides by logs of calantas (cigar-box wood) and broad planks of narra, banuyo, molave, pagatpat, dungon, malambingan, and narig.

The display of Dipterocarps (the woods of the Lauan family) occupied the entire north wall inside the exhibit and the south side of the exterior. Planks were shown of palosapis, apitong, red lauan, tanguile, mangasinoro, and almon (white lauan), mangachapuy, yacal, and guijo, ranging from 15 to 114 centimeters in width.

The main idea in giving the Lauan family so prominent a place was to combat the notion, so prevalent the world over, that the bulk of a tropical forest consists of the very hard and durable woods. This belief is erroneous as regards any part of the tropics, and in no place more so than here. The best single instance to illustrate its untruth is the fact that yacal, the most plentiful of the very hard woods in the Islands, is the least plentiful, at least here, of the Dipterocarps, the greatest timber family of the Indo-Malayán region.

The whole exhibit, except the loaned articles, will be installed permanently in the Museum at No. 158 Calle Anloague, Binondo, Manila, which will be thrown open to visitors about the middle or end of March, 1910.

BUREAU OF SCIENCE.

The Bureau of Science exhibit was particularly suggestive of possibilities in the future of the Philippines. The division of mines displayed, among other things, a model of a mine, showing the methods of working. A mineral relief map of the Islands, the work of I. Reyes and R. Nostrates, of the School of Commerce, indicated the location of the various minerals by means of colored flags, and relief maps of Mayon Volcano, Batan Island, Aroroy, Mancayan-Suyoc and Benguet mining districts, also the Compostela and Davao coal fields were shown together with the published maps from which they were made. A wall map showed the distribution of coal in the Islands, and there were samples of the product from Surigao, Cebu, Antique, Albay, Infanta, Misamis, Sorsogon, Iloilo, Mindoro, and Mindanao.

Rickeries of gold-bearing quartz from several mines were exhibited, and gilded bars indicated the increase in the gold production of the Islands from year to year. Iron was represented by a heap of black hematite iron ore from the Hison mine in Angat, Bulacan Province, donated by Doña María Fernando; this was accompanied by plowshares and other articles manufactured from the smelted ore. Collections of minerals in cases, samples of guano from the bat caves of Tayabas, and samples of petroleum from Cebu and Tayabas completed this branch of the exhibit.

The contribution from the chemical division consisted mainly of samples of various oils, arranged in groups. These included specimens of oil of turpentine, balao, resin, and elemi varnish, ocimum, ginger, vetiver, lemon-grass oil, ylang-ylang and cananga, blumea or sambong and lantana oil, native cinnamon-bark oil, coconut, peanut, and sesame oils, and canarium, candlenut, and kapok oils. Each sample of oil was accompanied by an herbarium sheet, showing the character of the tree or plant from which it is obtained. Other features were drugs and dyestuffs, copal and other gums, champaca flowers, cinnamon bark, and cassava.

In the silk exhibit the life of the silkworm was shown in all its stages, from the egg to the finished cocoon. Hanks of silk of various grades and colors were exhibited in cases, some being from the Philippines and others of Chinese origin. With these were fabrics made entirely or partly of silk—mainly of native manufacture. One card contained twelve samples of silk goods woven in the Islands and colored with native dyes.

The division of fisheries was represented by mounted specimens of fish, sponges in all stages, "pearl" buttons and the shells from which they are made, and coral from Davao.

BUREAU OF PUBLIC WORKS.

The exhibit of the Bureau of Public Works consisted almost entirely of photographs of irrigation structures and irrigation methods. These photographs showed the nature and extent of irrigation structures in India, Egypt, Java, and the Philippine Islands. For the most part they were collected by Mr. J. W. Beardsley, former Consulting Engineer in Charge of Irrigation Work, while on a trip through the above-mentioned countries for the purpose of investigating irrigation methods. There were among these pictures photographs of the local methods of thrashing rice and of plowing and harvesting the rice crops. Two tabular statements were given showing the

importation and exportation of rice from the different countries of the world, so that the comparison might be made of the standing of the Philippine Islands as a rice-producing nation.

A steel headgate manufactured in the Philippine Islands by the Atlantic, Gulf and Pacific Company was also exhibited. To date more than 100 of these headgates have been purchased by the irrigation division. These gates are so arranged that they may be raised or lowered any distance desired, so that the amount of water in the canal may be controlled. They may be located at any point and can not be interfered with. They are usually placed in concrete and are very firm and durable. With proper care one of them should last from fifty to seventy-five years at the very least. A steel headgate of the type shown is a very necessary article on Philippine irrigation canals. Nearly all of the canals in the Philippine Islands are of a primitive type and there has been no attempt to control the water running in the canals. As a result the canal banks have been damaged by excess of water and a great deal of water has been wasted which might have been used later for irrigation purposes. It is to be hoped that a few years' time will see all the irrigation canals in the Philippine Islands under positive control, so that water may be diverted or not according to the needs of the irrigator.

The exhibit of the irrigation division was descriptive of the beginning that the Government has made in the construction of irrigation systems, and as the work goes forward there is no doubt that each succeeding Carnival will see a larger and more instructive exhibit on irrigation construction and irrigation methods.

BUREAU OF INTERNAL REVENUE.

This exhibit was made for the purpose of introducing denatured alcohol to the attention of the public consuming it industrially for light, heat, and power. The superior illumination noticeable was from lamps burning denatured alcohol. Stoves, flatirons, and other implements of domestic use burning alcohol were contributed by various firms of Manila in order that their value might be demonstrated to the public. A gasoline engine taken from a launch of the Internal Revenue Bureau and installed as a stationary engine in the exhibit, was utilized to furnish power for the silk-reeling machine operated by the Bureau of Science in the adjoining exhibit. No special preparation or change was made in this engine and it worked satisfactorily throughout the period of the Carnival.

The opposite side of the exhibit was given over to showing the development of the alcohol industry in these Islands from the passage of the Internal Revenue Law in 1904. Examples were given of the ancient *cawa* found in almost universal use at that time, there being some 400 so-called distilleries then operating. In 1907, after two years of work and practical demonstration, the distilleries of the Philippines were all induced to use a modern equipment for distilling, and working models of the present equipment were shown with photographs of various types of distilleries and equipment, and of the nipa and coco regions in which alcohol is manufactured. In 1905, with nearly 400 distilleries in operation, there were distilled 5,483,690 proof liters (1,448,626 gallons) and the tax collected was ₱1,096,738. By 1909 the number of distilleries had been reduced to approximately 60, all under modern conditions, and there were produced 11,252,155 proof liters (2,972,841 gallons), and the tax collections therefrom amounted to ₱2,250,451. There is not much doubt but that the investment of foreign capital in the sugar lands of the Philippines will give a great impetus to the production of industrial alcohol, as the establishment of "centrales" will afford opportunity for using the by-products of the cane in the process of sugar making for the distillation of alcohol.

BUREAU OF NAVIGATION.

The exhibit of the Bureau of Navigation at the Philippine Carnival may be divided into three main features: First, that representing the navigation division of the Bureau; second, the light-house division; and third, the division of port works.

The display of the navigation division consisted of a model of a coast-guard cutter, of which the Bureau now operates thirteen, and of models of the lines of ketches, whaleboats, cargo boats, lifeboats, etc. In the early days Bureau cutters were used principally for coast-guard work, but recently their chief occupation has been to operate over commercial routes, giving passenger, mail, and freight connections between the more isolated and larger ports of distribution. This method of developing trade through the Islands is still being carried on with satisfactory results, and when a route becomes sufficiently developed to warrant the operation of a commercial boat over it, the Bureau of Navigation withdraws its vessel and turns the route over to a commercial firm.

The marine railway and repair shop of the navigation division of the Bureau has met with very satisfactory results in the

construction of small craft, such as sailing sloops, motor boats, and lifeboats, small models of a number of which were on exhibition.

Perhaps the main feature was the exhibit of the light-house division, which consisted of a display of first order, fourth order, fifth order, and several sixth order lights, in addition to samples of clockwork, lenses, and a model of Laius Ledge light station, which is under construction and will probably be put in operation within the next few months. The first-order light exhibited at the Carnival was placed at Capon, Grande Island, on the west coast of Luzon, a few miles north of the entrance to Subic Bay, in the early nineties, by the Spanish Government, at a cost of approximately ₱80,000. A first-order light with an ordinary wick burner placed at a sufficient height above the sea level will throw a flash under ordinary weather conditions about 40 miles and under some conditions it would be visible at even a greater distance. With an incandescent burner the arc of visibility would still be increased. The fourth-order light exhibited at the Carnival was recently purchased at an approximate cost of ₱10,000. This light, as soon as funds become available, will be placed at Point Flechas, on the east coast of Palawan, where it will be visible some 15 or 20 miles. The fifth-order Universal light displayed is a light which is held in Manila for emergency requirements. It is so constructed that it is adaptable to replace any light which may become out of order or which may be placed under repairs. A sixth-order light is usually placed so as to have a range of from 12 to 18 miles and is the type of light, with the exception of lens lanterns, most commonly used in the Philippine Islands. Lens lanterns are used mostly as port lights, indicating entrances to harbors, ends of piers, jetties, sea walls, etc. The model of Laius Ledge light is the model of the sixth-order flashing light. This light is in course of construction in Cebu Harbor and when completed will represent an expenditure of some ₱8,000.

The Archipelago is made up of a thousand or more islands, some of which are merely small reefs, which makes it imperative, in order to properly safeguard navigation at night, to maintain an up-to-date light service. At the present time there are in operation 139 lights, 53 beacons, and 125 buoys. The exhibit at the Carnival of 1910 indicated only in a small way the extent of the light-house service of the Philippine Islands, yet apparatus to the amount of over ₱100,000 was displayed.

The third feature exhibited at the Carnival was that of the division of port works. The model of the steel wharves exhibited

was a sectional view of the new steel wharves recently constructed at the port of Manila at a cost of over ₱1,200,000. The use of these wharves with railroads running down to deep water will undoubtedly make Manila the cheapest port for handling cargo in the East. The model of the Iloilo wall showed the improvements that are under way in Iloilo wharfage facilities. The project for the improvement of this port will represent an investment of nearly ₱2,000,000 and a saving in cargo handling of about ₱315,000 per annum.

Under the supervision of the division of port works of the Bureau of Navigation much is being done toward deepening rivers and harbors, building wharves, etc., all of which will result in a decreased cost in cargo handling and a great assistance in the commercial development of the Philippine Islands.

BUREAU OF PRINTING.

The Bureau of Printing exhibit occupied a separate building, to the left of the main gate as one entered. The pavilion style of the building, with railings, enabled the sightseers to view the exhibit from all sides. The hours of operation were from 4 to 11 p. m. and the crowds that continuously lined the railings interested themselves in observing actual production by old and new methods. Alongside the old style of hand-feed platen printing press, printing sheets at about 1,200 an hour, was a modern automatic-feed printing press delivering 12,000 printed sheets an hour. Typesetting by hand as compared with a modern typesetting machine was an interesting demonstration of the wonderful strides made within the last few years in the printing trades. The old method of sewing books by hand and the new method of sewing them by machinery attracted considerable attention.

Beside a demonstration of the old and new methods of operations in typesetting, presswork, and bookbinding, employees of the Bureau were executing all the specialties of book finishing, photo-engraving finishing, and electrotype finishing. The various stages of a half-tone plate and of an electrotype plate were shown by samples above the finishers. On a shelf back of the book finishers were arranged samples of all styles of bindings, from pamphlet to full russia leather with extra hubs. There were books bound in full levant morocco with decorated edges of gold and the sides and back beautifully hand tooled, one book in particular showing a human face in relief gold; others with floral and gold designs. These beautiful bindings

were executed by Filipinos who were taught by an American craftsman instructor.

This exhibit presented an excellent idea of what has been accomplished by the Bureau of Printing by the proper instruction and supervision of Filipinos in the numerous specialties which enter into the production of a book. The work of the Bureau is almost wholly done by Filipinos under supervision of American craftsmen instructors.

BUREAU OF EDUCATION.

Division superintendents and teachers especially will be interested to know that the Bureau of Education made a good showing at the recent Carnival in Manila. The exhibit occupied three buildings, the larger structure, containing the provincial exhibits, was erected by students of the Philippine School of Arts and Trades and was the most substantial building on the Carnival grounds. The schools of the city of Manila made a very excellent showing in a working exhibit of lace and embroidery making, hat weaving, and domestic science. Shipments from the provinces came in such large quantities that only the best articles could be shown. The work of the trade schools was represented in a fine display of furniture.

The buildings were visited by great numbers of Filipinos and Americans, and the exhibits were heartily commended by everyone. Thousands of people by this means gained a new and more correct conception of what the Bureau of Education is doing along industrial lines. The following is a summarized report of the exhibition by the Bureau of Education:

Number of separate exhibitions.....	33
Number of articles exhibited.....	677
Approximate value of exhibition.....	₱10,428.86
Total number of articles sold.....	2,648
Total value of articles sold.....	₱3,707.28
Total number of articles returned.....	3,864
Approximate value of articles returned.....	₱6,570.27
Number of articles lost or unaccounted for.....	238
Approximate value of lost and unaccounted for....	₱151.31
Number of unidentified articles in storeroom.....	59
Approximate value of unidentified.....	₱50.00

THE PROVINCIAL EXHIBITS AT THE CARNIVAL.

By far the largest number of provinces that have ever taken part in the Philippine Carnival took part in the agricultural and industrial exhibit this year. Ten provinces, namely, Bulacan, Rizal, Pangasinan, Pampanga, Iloilo, Cebu, Albay, Moro, Ilocos Norte, and Misamis, had on exhibition specimens of the products from their farms, shops, and factories.

BULACAN.

One of the most interesting industrial exhibits at the Carnival was that of Bulacan. Perhaps the leading feature of this exhibit was the large variety of hats from the town of Baliwag. These hats are made in many shapes, colors, and designs for ladies and gentlemen and some of them are of very fine workmanship; they range in price from ₱3 to ₱40. Beside the hats there was quite a variety of ornamental baskets, wall pockets, flower baskets and imitation flowers of many classes, also toy houses for children, a large number of baskets, straw chinelas, and an interesting collection of beadwork baskets, wall pockets and centerpieces made of a seed popularly known as "Job's tears," some very interesting samples of silk handkerchiefs made in the town of Baliwag, several samples of jusi and sedalina, and wall mats with pockets for fans, pictures, or other small articles.

There were many samples of different kinds of bejuco, small samples of about sixty different kinds of woods grown in the province, and quite a large collection of furniture made from bejuco which was worthy of notice. Portieres made from small pieces of *katigbi* (Job's tears) and bamboo were exhibited, and a variety of large and small picture frames made in Malolos and San Miguel, which showed considerable artistic ability.

In addition to these there was exhibited a large collection of different varieties of rice, corn, and other grains grown in different parts of the province, also samples of wines, liquors, and nipa tuba manufactured in the town of Hagonoy, which is located in one of the largest nipa sections in this province.

There was an interesting collection of the different kinds of

pottery made in the towns of San Rafael, Angat, and Calumpit. There were also samples of mineral waters from Sibul and Norzagaray; some of these waters are already noted for their medicinal value and Sibul is fast becoming popular with those troubled with stomach and bowel diseases, who find health from drinking the water and using the baths at this place.

Another interesting exhibit consisted of a variety of knives, bolos, and pruning knives manufactured in the towns of Angat and Meycawayan. The town of Angat is noted for having the only iron mine which is being worked in the Philippine Islands, and it should be further noted that the owner and manager of this mine is a women, Doña María de Fernando. There were a number of samples of native plowpoints and moldboards made in the factory of Matías E. Fernando and several baskets containing samples of iron from Angat, a small sample of almaciga, and a variety of floor, wall, and bed mats or petates.

RIZAL.

One of the first things in the Rizal exhibit to catch the eye of the visitor was the miniature representation of the "Hacienda Remedios" in the town of Montalban, owned by Sres. Sampedro and Manahan. This representation was intended to show on a small scale some of the physical features of the hacienda and the variety of farm products which are raised on it. In this miniature hacienda was a representation of the cave and the irrigation system, the water for which is furnished by the Manila waterworks, plants of corn, rice, tobacco, gabi, camotes, tugui, cassava, uve and gogo, which is used by many of the native people for cleaning the hair in place of soap—a very satisfactory variety of plants which, if they can be successfully raised, should bring good profits to the owners of this plantation.

The remainder of the exhibit from the town of Montalban consisted principally of a large wooden tub or bowl for washing clothes, samples of kaolin, almaciga, gogo, also nito, sangumay, and bejuco, which are used in making hats, mats, etc., and a collection of large bejucos used in making chairs and furniture.

Other noticeable exhibits from this province were pilones and bayones for native sugar which are manufactured in San Mateo, and some good samples of bamboo grown in the same town. Beside the exhibits of sugar and sugar cane was a sample of a mammoth bamboo, also small samples of hemp, raised in the town of Mariquina. While this hemp was very white and apparently a good variety, it is much shorter than the most common



PLATE IV.—FIBER EXHIBIT OF THE BUREAU OF AGRICULTURE.



varieties grown in the hemp sections of the Islands. Other products produced in San Mateo were some samples of tobacco leaves, corn, tomatoes, beans, eggplant, also a sample from the tanato tree; this bark is also used for rope and other purposes. Besides these there were some samples of the handiwork of young ladies of the town. Many varieties of rice which are raised in the different towns of the province were shown, some very good samples of crude and refined sugar manufactured at the Luzon Sugar Refining Company's factory in Navotas, and some samples of salt gathered from the many salt beds in the town of Parañaque. In addition to these there were samples of hats made of sabutan from Pililia, some mats from Tanay, one of the most interesting of which was made in colors to represent the American flag, and very pretty samples of jusi and sedalina.

PANGASINAN.

One of the best exhibits to show the varied resources of a single province was that of Pangasinan. This exhibit contained, first of all, samples of about a hundred different varieties of rice grown in the province. It is well known that Pangasinan is the second largest rice-producing province of the Islands. In 1908 this province sowed 115,000 hectares and harvested 1,080,000 cavans of rice. There were also samples of something like 75 or 80 varieties of woods grown in different parts of the province.

One of the most interesting divisions was that of the hats, petacas, etc., made in Calasiao and neighboring towns. Calasiao, next to Baliwag, is noted for the manufacture of the best hats made in the Philippines. For many years the people of Calasiao have been engaged in this industry, and the hats made there are used not only in practically all parts of the Philippines, but many of them are shipped to foreign countries, where there is a growing demand for them. These hats are made mostly of nito and buri, and range in price from 50 centavos to ₱50. The exports of Philippine hats amounted to ₱337,044 for the fiscal year ending June 30, 1909.

There was also an interesting collection of *basi* and other wines made from nipa and sugar cane. Pangasinan, like Bulacan and Capiz, has one of the largest nipa industries in the Philippine Islands. This industry promises a large income to those interested in it providing the product can be utilized in making denatured alcohol. In this connection the very interesting exhibit by the Bureau of Internal Revenue showing the different uses of denatured alcohol for heating, cooking, and lighting purposes, also as a motor power for running small

engines, seemed to demonstrate its utility beyond a question of doubt. Under such conditions it seems to be altogether likely that the nipa factories which have been for some time almost abandoned may be put in operation again and become one of the leading industries of the Islands.

There were also many models of tools, fish traps, samples of pilones, small stoves, pieces of pottery, and a number of specimens of needlework. There was an interesting collection of different kinds of seeds of plants, such as mongos, sitao, cacao, calabasa, pepino, amargoso, mostasa Filipina, haba, tomatoes, frejoles, native lemons, calabasa redonda, sandía, patola, tamarind, berengena, ajonjoli blanco, corn, pepper, upo, camote, uve, gabe, tugui, melons, bucacao used for food the same as rice and corn, algodon, batao, several samples of corteza de samac, samples of maguey fiber, also fibers of baroy, collot, and linao used for making ropes, which are grown in various parts of the province; and native woods such as banabá, paranopin, narra, sagat-molave, bolala-ubien, lim-manca, canela, canomey, lanoté, and acle. There were also several samples of leaf tobacco and copra and rope manufactured in Lingayen. Besides this there were some very good samples of different kinds of stone for building purposes available in this province, and some samples of kaolin, one of which was almost pure, others containing considerable deposits of iron which gave a reddish color. Samples of copper ore, resin, and almaciga were exhibited from the town of Umingan.

This exhibit was made very attractive by the distribution of fine large photographs of the principal provincial buildings throughout Pangasinan; amongst these might be mentioned the San Carlos municipal school building, municipal school of Binmaley, the Bayambang intermediate school, the municipal school of Dagupan, the municipal school of San Fabian, and the intermediate school of Binalonan, the schoolhouses in San Carlos and Tayug, views of some of the best bridges and public works, such as the Pao-Umingan Road and the Lingayen-Camp One Road. Many of the exhibits from this province were from the Hacienda "La Esperanza" of Matías and Joaquín González which includes land in the towns of Santa Maria, Umingan, San Quintin, Rosales, and Santo Tomas. This plantation is said to be the largest in the Philippine Islands.

PAMPANGA.

The most complete and satisfactory exhibit of all the provinces was that of Pampanga. One of the first things noticed by visitors to this exhibit was a table approximately 8 feet in diameter made from narra, the property of Mr. José Piñon, of

Guagua; this was a part of a very notable collection of furniture manufactured in Pampanga, perhaps the best of its class manufactured in the Islands. It consisted of parlor chairs, vis-a-vis, *confidentes*, settees, office desks, upholstered chairs, and a beautiful writing desk made of nanca, the property of Dr. Felino Simpao, valued at ₱250. These pieces were made mostly of sandalo, aguso, and molave woods. There were many interesting samples of rustic furniture for use on porches, in yards or lawns, also a large variety of frames for pictures, made of bacauan and malabutol-aso.

A most interesting model in this exhibit was that of a small engine made by Mr. Juan Reyes, 16 years of age. This young man has made many devices, amongst others a model of a small launch; he has now been taken in charge by a well-to-do patron, who has placed him in the school of arts and trades in Bacolor, Pampanga. There were also some interesting specimens of engravings, and work in tin, which included a model of a very novel coffee pot, *cafetera*. In this section of the exhibit was a collection of artificial fruits, such as papayas, bananas, ciruelas, chicos, granadas, guayabas, lolomboy, lanzones, casuy, tarante, mangoes, atis, and camachile, which showed a great deal of artistic ability in this line of manufacture.

The agricultural exhibit of this province was decidedly the best provincial exhibit on the Carnival grounds. It included small sheaves and bags of rice, bags and pilones of sugar, and piles of corn in such quantities as to indicate the importance of these plants in the agricultural work of the province, which is one of the first agricultural provinces in the Philippines. These exhibits included white squash, sincamas, yellow and green squash, peanuts, celery, sweet potatoes, ampalaya, eggplant, repolio, arrowroot and flour made from the same, uve, many varieties of citron, tobacco leaves, cacao, patola, oranges, native lemons, peppers (red and green), beets, beans, pomelos, cacao seed, pineapples, bonga, violeta, and bejuco. The back wall of this exhibit was lined with stalks of sugar cane from Pampanga Province; upon this background the letters of the name of the province were made out of ears of yellow corn.

An aquarium containing wild ducks and fish was a novel feature. It is said that these ducks are found in large numbers on the Pinac or Lake of Candaba, which forms a part of the east boundary of this province, separating it from Bulacan. It is about an hour by boat from Mount Arayat, one of the most beautiful landmarks in Pampanga Province.

The remainder of this exhibit was arranged in sections. In

one of these sections was a native loom used to demonstrate the method of making native cloth, which is one of the principal industries in the town of Macabebe. In another section was an interesting exhibit of clays and pottery manufactured in the town of Apalit. Another section contained a very creditable exhibit of the bread, cakes, and confections of the Apalit bakery; still another section contained wall pockets, baskets, ornaments, portieres, etc., made in the same town, also a very valuable collection of jusi and rengue cloth from the town of Angeles. The last of these sections contained an exhibit of nipa products, alcohols and liquors, and a collection of nipa for roofing and house building by Ayala & Co. from their nipa hacienda in San Esteban, Macabebe. There were also samples of charcoal, sacks of lime, and bundles of sapan and wood used for making coloring matter or dyes, and many samples of hats, petates, bayones, and bolos manufactured in the town of Apalit. The whole exhibit was well arranged and the progress of the province was well presented by numerous photographs of the principal provincial and municipal buildings and improvements, such as the provincial government building, the provincial jail, the provincial school buildings and the municipal market of San Fernando, photographs of bridges and other public works, also pictures showing the manner of harvesting, transporting and milling sugar cane. Another industry in this province which is worthy of mention is the manufacture of guitars, mandolins, bandurrias, etc.

ILOILO.

An excellent exhibit of the products of its leading industries was shown by Iloilo Province. Representing the agriculture of the province there were a large number of varieties of rice, cacao from Pototan, *balatong* and *cadios*, a food product from Passi and Calinog, *luya* (a medicinal tuber), white and yellow squashes, citrons, camotes, *uve*, pomelos, corn, mangoes, and kapok or tree cotton which is grown near Passi and in other sections of the province. Beside these there were 35 packages of leaf tobacco which were raised in the province. Tobacco cultivation is said to be the second important industry in the province. There are large areas of good river-bottom land which are now uncultivated for lack of capital and farm animals. The Compañía General de Tabacos de Filipinas is the only house buying the tobacco of the Iloilo farmers. While Panay tobacco is said to be second quality, it is believed that it can easily be made of first quality by giving the necessary attention to the cultivation and care of the plants. The people of Iloilo Province are enthusiastic over the

prospect for this industry, and they invite those who have capital to invest and are interested to investigate the opportunities for tobacco cultivation in the province.

One of the leading industries in Iloilo, as in the provinces of Negros, is growing sugar cane. The exhibit contained some fine samples of sugar, also some excellent illustrations showing gang plows and engines in operation preparing the soil for planting and some fine views of cane fields in different sections of the province; this division of the exhibit also contained some very good specimens of two kinds of sugar cane, white and red, which were apparently of excellent quality; there were also some views of sugar mills in operation, which make a striking contrast when compared with the modern mills now in use in Hawaii and Formosa.

A number of samples of a fine grade of hemp, articles made from hemp fiber, a sample of "anabo," a kind of fiber used extensively in making cheap twine and rope, were also on exhibit.

By far the most attractive feature of this whole exhibit, to the ladies at least, was the remarkable collection of native textiles woven on hand looms in the towns of Miagao, Guimbal, Leon, Jaro, and Tigbauan. The Island of Panay is noted for its weaving industry; its jusi and piña cloths are probably the finest made in the Philippines. However, it might be stated that this industry is not confined solely to Iloilo Province, as Calivo and other towns of Capiz Province, also some towns in Antique, have produced on their looms fully as fine quality of jusi and piña as any of the towns above mentioned. The exhibit of the different classes of these fabrics—jusi, piña, sinamay, silks, laces, etc.—was the most complete on the Carnival grounds and contained the largest variety of the highest grade of native woven goods made anywhere in the Philippines. These cloths varied in design from the simplest pattern to the most varied and intricate designs in flowers and colors that one could use or wish for. As a part of this exhibit were four hand looms from Iloilo, Jaro, Arévalo, and Miagao which were operated during a part of each day, showing the method of making the cloth.

Closely related to the textile industry is that of hats and mats, which is quite an important occupation with the people in the towns of Pototan and Passi in Iloilo Province and Dumarao in Capiz Province. These hats, mats, and petacas are made mostly of buri, nito, and tayok-tayok (sabutan) fiber.

One of the features of the Iloilo exhibit which is worthy of

mention was the exhibit of the Jaro Industrial School Republic. This contained a number of useful articles which were well made and durable.

CEBU.

The exhibit from the Province of Cebu consisted principally of a number of very good samples of hemp from the towns of Cebu, Compostela, Argao, Carcar, Ginatilan, and Danao; samples of maguey from the towns of Simalao, Sibonga, Balamban, Liboan, Maslog, Compostela, Danao, Naga, Ocaña, San Fernando, Bago, and Valladolid; samples of rope made of maguey fiber, samples of kapok, tree cotton, from Talisay, Mandaui, and Valladolid.

There were samples of about 20 different kinds of wood found on the Island of Cebu, among which are ipil, pagatpat, balitanan, lumbayao, balamansanay, mangachapoi, almontanguile, narra, yacal, molave, yellow narra, lauan, apitong, guijo.

There was also a large number of samples of different kinds of rice and corn raised on the Island of Cebu. It might be noted that corn has perhaps been more successfully and extensively raised in Cebu than in any other province in the Philippines. There were samples of copra, and sugar made from sugar cane raised in Cebu, peanuts from Valladolid and Ocaña, cacao from Naga, mangoes and castor oil beans from Valladolid and Ocaña, a sample of almaciga (gum copal), samples of *panol tangog* bark from Sangat used for coloring tuba, and coal from the mine near Danao on the Island of Cebu. A notable feature of this exhibit consisted of about 50 large packages of leaf tobacco which had been raised in Cebu. Tobacco growing is one of the most important industries on this island.

ALBAY.

The exhibit of this province consisted mostly of samples of fibers, several bales of hemp, and fiber-stripping machinery; three models of Behrendt hemp-stripping machines made by the Watson Company were on exhibition. Hemp raising is the leading industry of this province and it should also be stated that Albay is one of the most important hemp-producing provinces in the Philippines. According to the published report of the Manila Chamber of Commerce Albay furnished 548,194 piculs of hemp to the Manila market in 1908—more than one-third of the whole product—while the next largest shipment from any one province was 318,059 piculs from the Province of Samar.

There were samples of coal from the East Batan mine on the

Island of Batan. The importance of Albay's coal mining industry can hardly be estimated at this time. This coal is now being used by several different Manila firms, by the Quartermaster Department of the United States Army, and others. Regular shipments are now being made to Manila and there is already some demand for Batan coal in foreign ports.

The exhibit included some samples of rice raised in Albay, a model of a rice mill run by water power, a number of interesting samples of pottery, and some furniture. There was also a large variety of native cloths which are woven in different parts of the Province of Albay, such as pinolpog, made in Legaspi, and sinamay made in Daraga, Albay, Legaspi, and Camalig. In this exhibit also a native loom was in operation, demonstrating the method of making sedalina, a cloth made of jusi and silk threads with a satin finish.

MORO.

The exhibit of this province was arranged in groups from the subprovinces or districts of Davao, Cotabato, Lanao, Zamboanga, and Sulu. These exhibits were composed largely of Moro shields, helmets, spears, brass, bolos, creeses, barongs, camphilans, Moro cloths, etc.

The agricultural exhibit of the Moro Province consisted largely of hemp from Davao, which is noted for its length and whiteness, some fibers being from 17 to 18 feet long, and though it is much coarser than the same grades stripped in the same way from Albay, Camarines, and Sorsogon, there is a large demand for it on account of its length, color, and strength. Davao without doubt furnishes the strongest and best varieties of hemp grown in the Philippine Islands, and is justly noted for its hemp plantations and for the quality of hemp put on the market at that port. In addition to hemp, there were samples of beeswax, peanuts, almaciga (gum copal), and a fine collection of native woods placed on exhibit by Lyon & Co., which included the following: Balacbacan, malabingan, narig, calantas, lauan, lumbayao, ipil, narrra, cubi pagatpat, tindalo, molave, mangachapuy, and dungon. There were also some excellent samples of a large variety of bejuco, four gigantic stalks of sugar cane sixteen months old, measuring 28 feet, and some coconuts. The Sulu exhibit contained samples of salt, almaciga, tree corral, peanuts, large stalks of sugar cane, and a number of samples of native woods which grow on the Island of Jolo.

ILOCOS NORTE.

The most striking feature of the Ilocos Norte exhibit was the samples of native blankets called binacol (sabana peluda) which are woven only in this part of the Islands. These blankets and the closely woven cloths have been for many years produced by the people of the Ilocos Provinces, and many of them are of superior quality. A fine collection of hemp and maguey textiles and cotton cloths, such as towels, table covers, etc., were on exhibit. In addition to the weaving industry, there were exhibits of a large variety of native woods, and samples of furniture made of bamboo, including beds, tables, chairs, settees, rocking-chairs, and some very well made trunks. The agricultural part of this exhibit consisted of samples of tobacco, rice, maguey, corn, peanuts, mongo, various kinds of melons and other seeds. There were also some very artistic specimens of handiwork in the form of fans, baskets, ornamental centerpieces, beadwork, etc., some native hats, mandolins, bandurrias, and guitars.

MISAMIS.

This very creditable exhibit from a distant province consisted principally of samples of hemp and other agricultural products raised in the province. Samples of rice, cacao, dawa, coconuts, copra, tobacco, and several varieties of coffee raised near Cagayan de Misamis were shown. In this exhibit there were also hammocks, petates, and a number of fabrics and pieces of hand needlework. Several looms were kept in operation a part of each day for the purpose of demonstrating the method of weaving native cloths. Native woods of the province were exhibited, also wax, gutta-percha, virgin wax, almaciga, and there was a very creditable exhibit from the Cagayan trade school, consisting of office desks, tables, chairs, bookcases, picture frames, etc., beside a great deal of similar material, such as baskets, fans, many varieties of wall pockets, chinelas, etc. Two hemp-stripping machines made by Vicente Reyes Barrientos, Nos. 8 and 9, were on exhibition.

THE THIRD ANNUAL EXHIBITION OF THE MANILA HORSE SHOW ASSOCIATION.

By Mr. HENRY BIRKETT,
Vice-President of the Association.

The Manila Horse Show Association was started by Col. George M. Dunn and Capt. George Langhorne in 1908, and the first show was held in February of that year. The third annual show was held this year on February 6, 8, and 10. The association may now be said to have come to stay and undoubtedly more interest is being taken in the annual show year by year.

It is unfortunate that it is necessary to depend each year as the show time comes round on the generous support of some of the business houses, the clubs and private individuals in the way of cups for prizes, as the entry fees, membership fees, and gate receipts have so far been quite insufficient to defray expenses.

The association and show are undoubtedly a necessity to Manila, as I think it may be said without fear of contradiction that Manila and its suburbs contain as many horses in proportion to its population as any other city in the world. The object of the association is the improvement in the breed of horses in Manila and the Philippines generally, which it hopes to effect by means of the annual show. Undoubtedly the exhibits would not compare unfavorably with the ordinary horse shows in other parts of the world.

Generally speaking, the shows thus far have been entirely supported by Americans and Europeans, both as regards membership and entries, and undoubtedly the association has to thank the Tenth Cavalry for the success of the first two shows and the Twelfth Cavalry for that of this year. Each year five or six classes have been offered for Filipino ponies, but only one or two classes have been filled, and the entries for these were very poor. For some reason it seems impossible to persuade the Filipino public to interest itself in the show. Each year hundreds of schedules of the classes have been distributed over Manila and sent to the provinces, but, as already stated, without

any success so far as getting Filipinos to exhibit their ponies was concerned.

A new class was introduced this year, by the energy of the Society for the Prevention of Cruelty to Animals, for carro-matas which plied for hire, and after a good deal of trouble on the S. P. C. A.'s part about 80 entries were finally made. As some 30 of these received money prizes, varying from ₱50 to ₱5, there should be a large entry in this class next year.

The association tries to interest every horse owner, and each year offers prizes for stallions, native and foreign brood mares, gentlemen's and ladies' hacks, combination horses, carromata ponies, pairs and single horses to victorias, roadsters, polo ponies, high jumpers, hunters, and classes for boys and girls.

Turning to this year's show, although numerically the exhibits were about the same as those last year, still the standards as a whole were certainly higher, and several blue ribbonists of last year, although shown in good fettle, had this year to concede the first honors to others.

The show opened with brood mares shown on a lead, a beautiful class won by Mr. W. V. Carter's Sis, a good mare, full of quality, beating Mr. Jones's Lulu and Tutu (full sisters), who were shown in excellent condition and who took first and second last year.

Gentlemen's hacks over 14.2 were a nice lot and the blue ribbon went to Mr. Chas. Aitken. A fine type of horse in Gen. William H. Carter's Tom Bass secured second prize, although perhaps more suitable for cavalry purposes than hack work. Foxy, the winner last year of this class, was shown, but in very poor condition.

The tandems again went to Mr. J. Garchitorena with his smart little team of grays. Mr. H. N. Cootes, aid-de-camp to the Governor-General, gave an excellent exhibition of driving, but was beaten for conformation and appointments.

Ladies' hacks under 14.2 was rightly won by Lieut. E. V. Armstrong's Kitty Winks (Thirteenth Cavalry), a nice quality bay mare and well shown.

A new pair to Manila, owned by Mr. B. F. Rahmeyer, easily won the phaeton class. This was a rare pair of trappers and fit to compete almost anywhere, although they were not shown in as smart condition as they might have been. They have excellent action and travel like clockwork.

The carromata class again brought out a large entry, and Mr. Juan Teus carried off both first and second prizes with Australian and Queen, beautifully turned out and well driven.

In the victoria class, Mr. J. Garchitorená was again to the fore with Ali and Aida, an undoubtedly smart turnout, but we preferred from the ringside both Rahmeyer's Bonnie and Beauty and Mr. Teus's smart black team, and should have placed them in this order. The carriages and appointments were all first class and fit to compete in any show.

The jumpers class was easily won by Mr. B. F. Rahmeyer's Aeroplane, a small pony just 14 hands, but beautifully ridden by Mr. K. T. Austin. He took everything as it came without a mistake.

Ladies' hacks over 14.2 went, and rightly so, to Mr. H. W. Butner's Denmark, well shown and ridden by Mrs. M. M. Talbot.

The combination class 14.2 and under brought out a really smart pony in Mr. Teus's King, who scored very easily. This is really a smart pony with excellent action, very good in front and clean all round. With better quarters he would win in any company. He also won the hack class 14.2 and under.

The stallions 14.2 and under brought out a large field, and it was a near thing between the Governor-General's Bay Arab and Dr. W. W. Richard's Silver Heels. The latter was shown in beautiful condition, but had to be content with second place.

Brood mares under 14.2 was quite one of the best classes in the show. The winner, Kitty Winks, a brown mare owned by Lieut. E. V. Armstrong, Thirteenth Cavalry, stood out from the other exhibits. She is an ideal brood mare, one of the sort that would mate with almost any type of stallion, and in her we have demonstrated the value of the thoroughbred sire as a producer of utility horses. She is undoubtedly full of thoroughbred blood, and while showing any amount of quality she has at the same time substance and bone to back it up. The second in this class, Juan Teus's black mare Queen, was a good showy type of mare but with faulty hocks. Among others that deserve mention were Mr. F. Lichauco's black, Mrs. A. G. Robertson's Goldie, and Mrs. Henry Birkett's Tryphosa.

In the stallion class an interesting exhibit was Capt. John E. Stephen's two-year-old colt locally bred, showing nice quality and more substance and bone than is usually met with in horses reared in this climate.

Mr. J. Teus was again first in the roadster class, owing to Mr. V. Fernandez' Ruch being overheight, and the same owner finished up the show by taking the speed class with Non-plus, a fast trotter, but lucky in beating Mr. B. F. Rahmeyer's Wonder.

THE FIRST PHILIPPINE LIVE-STOCK EXHIBIT.

By Prof. C. M. CONNER,
Assistant Director of Agriculture.

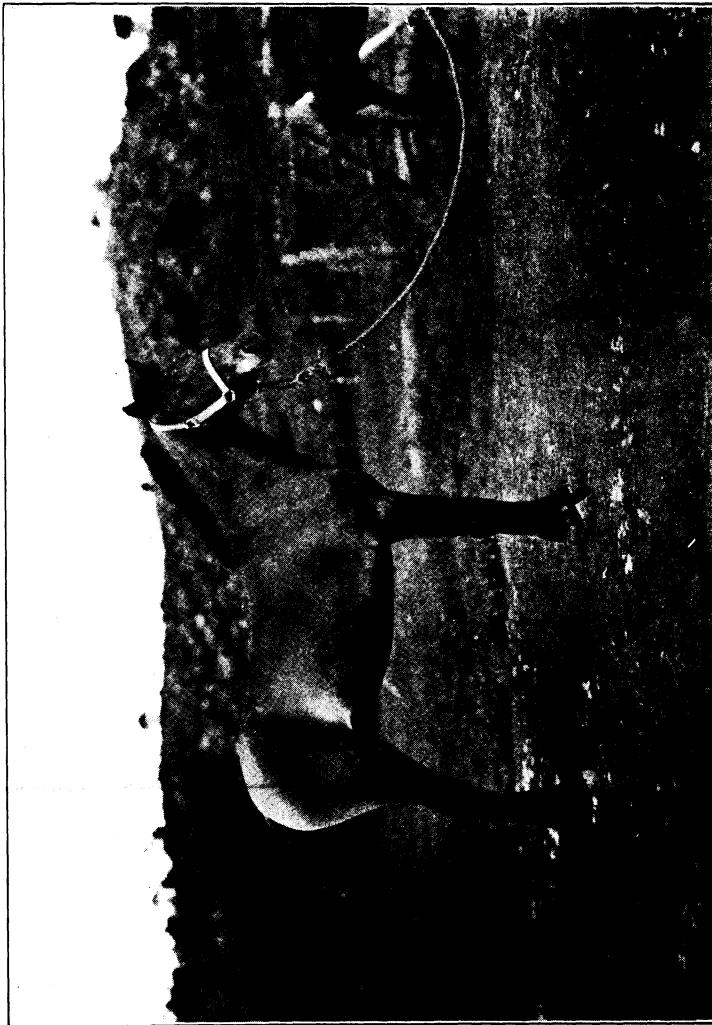
The exhibition of live stock at the Carnival this year was, so far as we are able to learn, the first of its kind ever undertaken in the Philippines. The animals on exhibition at the Carnival grounds were not the best, nor the only good animals in the Philippine Islands—in fact, with two or three exceptions, they were all owned within the city of Manila—but they were well worth going to see, even though they had not been specially fitted or prepared for show.

Lack of sufficient advertising of this feature of the Carnival in time for owners to put their animals in condition for exhibition, the inability of the Carnival Association to offer substantial premiums, and the inadequate quarters, coupled with the entire novelty of the venture and a general fear of exposure to infectious animal diseases, all made it difficult to arouse the enthusiasm of live-stock owners in the show. A number were found, however, who were willing to go to considerable trouble, expense, and risk, with no hope of compensation, and so the live-stock feature of the Carnival was inaugurated, and there is no reason why it should not be continued and increase in interest and importance.

The Bureau of Agriculture was the largest exhibitor, presenting stock from the Alabang and Baguio stock farms, besides a number of fine Indian cattle which have recently been imported for experimental purposes. The latter included two cows with calves at foot, several other young cows and heifers, four large bullocks, and one large bull in excellent condition. Mr. Faustino Lichauco, of Manila, also exhibited some bullocks of this breed. The Indian cattle are creating considerable interest throughout the Islands and attracted much attention at the Carnival.

The cross-bred horses entered by the Bureau were probably the most interesting feature of the show. These consisted of

PLATE V.—MESTIZO COLTS BRED BY THE BUREAU OF AGRICULTURE.



eleven head of colts, representing several different crosses—products of American mares by native stallions, of native mares by American stallions, and of native mares by Arabian stallions. The Arabian-native colts show a quality and style that made them general favorites at the Carnival and promise great things for that cross. Some of the individuals of all the various crosses were exceptionally fine animals, and all of them showed advantages over the pure native stock, although in some cases no special selection of the parents had been made. The only other horses in the show were three Indo-Chinese ponies exhibited by Mr. Lichauco, which were interesting on account of their diminutive size, being little larger than a large dog.

Other exhibits of the Bureau were some pens of imported Maltese and Spanish goats, and a pen of native-bred and imported Berkshire pigs. Another pair of pure, native-bred Berkshires was presented by Mr. Eugene Wickham, of Santa Mesa.

Aside from the Bureau of Agriculture, Mr. Faustino Lichauco was the only large exhibitor. In addition to the animals already mentioned, he entered some unusually good Indo-Chinese carabaos which were probably among the best in the Islands, besides some plainer Chinese and native cattle, and two Devon bulls imported from Australia.

Mr. Mariano Mol, of Pasay, had an interesting exhibit of Indian carabaos, very few of which have ever been introduced into the Philippines. The exhibit consisted of two aged animals, male and female, and a calf. Mr. Verstockt, of the Philippine Trading Company, presented four head of cross-bred (Australian-native) bull calves from the Jalajala hacienda which were said to have been taken directly from the range and shown without any preparation. They were well above the ordinary native range-bred stock in form and size and were in perfect condition. These animals were sold during the Carnival.

As already mentioned, several obstacles were encountered by the committee in securing entries for the exhibit. Probably the greatest of these was the natural one due to the fact that a live-stock show had never before been held in the Islands; this has already been removed. Next year it should be much less difficult to attract the interest of the public and within a few years the exposition ought to become self-supporting through the people most directly concerned. The Carnival being an Insular institution concerns everyone in the Philippines, and a live-stock show in connection with it should include the best products from every part of the Archipelago. Some years ago

one of the largest associations in the United States adopted the plan of providing free feed for all entries while on exhibition and paying all return transportation charges from the exposition grounds. If some such idea could be followed here, in connection with small cash premiums or medals for the best entries, until sufficient interest is created in the undertaking to make it self-supporting, it is believed that this exhibit would take the place it should occupy much sooner than it will otherwise do.

In spite of obstacles, the live-stock feature of the Carnival can, and it is believed will, be made permanent and prominent as it really should, and from the beginning made this year, modest though it was, there is every reason to feel encouraged for the future of an Annual Live-stock Exposition. The following is a list of the premiums awarded:

Carabao.—Aged bull—Indo-Chinese: First, F. W. Carpenter; Second, Faustino Lichauco. Cow: First, Faustino Lichauco. Indian: Diploma, Mariano Mol, on pair.

Chinese work bullocks, trotting bullocks, and native cattle.—Diploma, Faustino Lichauco.

Devon (imp.) bulls.—Diploma, Faustino Lichauco.

Mestizo calves.—Diploma, Mr. Verstockt, Philippine Trading Company.

Indo-Chinese ponies.—Diploma, Faustino Lichauco.

Berkshire swine.—Boar and sow, 1 year old: Diploma, Eugene Wickham, 639 Sta. Mesa.

THE FIRST POULTRY SHOW IN THE PHILIPPINES.

By Mr. HARRY A. IRELAND.

Although there are numerous poultry fanciers and hundreds of good birds in and around Manila, no attempt has been made until the present year to institute a poultry show. Some time before the Carnival of this year an announcement was made that a poultry show would be made one of the features of the Carnival, and later a canvass of poultry breeders and importers was made to secure entries for the show. The result was not all that could be desired in regard to the number of birds presented, but the general interest expressed and shown, both by fanciers and the general public, promises well for future shows.

The exhibits this year did not represent all the good poultry in Manila. Breeders did not become interested in time to select and fit their birds for exhibition, hence many fine birds were kept out because just at Carnival time they were not in good condition, and a number of owners of good flocks did not feel that they were justified in going to the expense of entering their birds for the consideration offered. However, a creditable little show was made, and if those who did not exhibit this year will fall in line next Carnival with those who did, the Second Philippine Poultry Show will be such that the most critical must approve. More commodious quarters will be required than those of the first show, but if sufficient interest is expressed there is little doubt that they will be provided.

There were eight breeds represented this year, and while some of the individual entries could not be called typical of their respective breeds and very few of the birds were in show condition, the exhibition, in general, was good. Mr. Jack Jenkins, who was awarded first prize on his exhibit as a whole, showed an excellent group of Barred Plymouth Rocks, a pen of half-breed Black Minorcas, and a mestiza hen with flock of twenty Barred Rock chicks; Mackay and Darley won second premium with their display consisting of a trio of Silver-laced Wyandot hens, a pen each of Indian Games, Buff Orpingtons,

and wild fowl, and three pens of Bantams. Mr. A. L. Barden presented a good pen of Barred Rocks, some young cockerels of the same breed, and a pen of White Leghorns; Mr. W. F. Hogle, Mrs. Lucile F. Page, and Miss Mary H. Fee also entered a pen, a pair, and two hens, respectively, of the White Leghorn breed. This breed seems to be fast coming into favor here on account of its egg-producing qualities, and some good specimens were shown. Mrs. Page had the first prize Barred Plymouth Rock hen of the show, although she entered but two hens of the breed, and won first prize in the White Leghorn class with the only hen of that breed she had in the show. A class was provided for cross-bred birds, and in this Mrs. Page and Miss Fee divided honors, as shown in the premium list given below. Mr. Eugene Wickham showed a pen of Japanese Games and the Light Brahma breed was represented by two young cockerels.

Maj. George P. Ahern and Sr. Rafael del Pan acted as judges of the show, though there was but little competition in any of the breeds except the Barred Rocks and the White Leghorns. Prizes awarded consisted of ribbons and diplomas. It is hoped that next year cash prizes may be provided, for although exhibitors have expressed no anxiety in regard to the matter, it would undoubtedly increase the quality and interest of the exhibition. Below is a list of the premiums awarded:

Barred Plymouth Rock.—Pen: First (blue ribbon and diploma), Jack Jenkins, 80 Zurbaran, Sta. Cruz, Manila; second (red ribbon and diploma), A. L. Barden, 99 Dominga, Malate, Manila. Cock: First, A. L. Barden; second, Jack Jenkins. Hen: First, Mrs. Lucile F. Page, 348 Nozaleda; second, Jack Jenkins.

Mestizo.—Cock: First, Miss Mary H. Fee, 243 Leveriza, Malate, Manila; second, Mrs. Lucile F. Page. Hen: First, Mrs. Lucile F. Page; second, Miss Mary H. Fee.

White Leghorns.—Pen: First, A. L. Barden; second, F. W. Hogle, 88 (int.) Singalang. Cock: First, W. F. Hogle; second, A. L. Barden. Hen: First, Mrs. Lucile F. Page; second, W. F. Hogle.

Buff Orpingtons.—Pen: First, B. F. Mackay, 42 Escolta.

Indian Games.—Pen: First, B. F. Mackay.

White Bantams.—Pen: First, B. F. Mackay.

Best exhibit.—First, Jack Jenkins; second, B. F. Mackay.

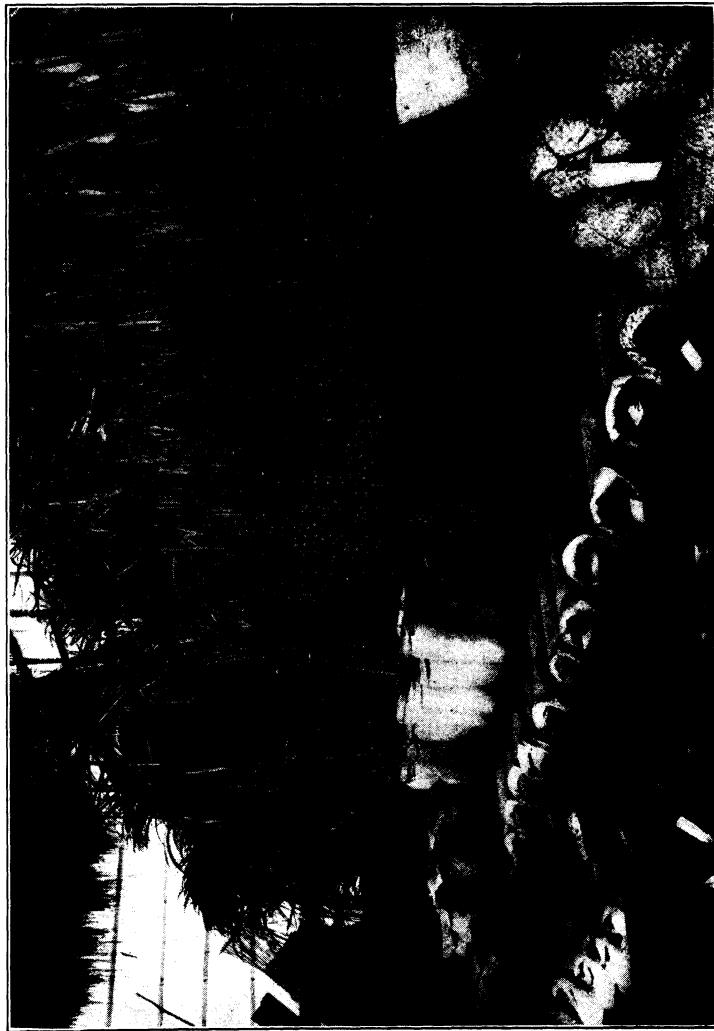


PLATE VI.—PAMPANGA'S PRIZE EXHIBIT AT THE CARNIVAL.



THE FIRST PHILIPPINE DOG SHOW.

By R. D. FERGUSSON,
Vice-President of the Philippine Kennel Club.

Maeterlinck has said that "amid all the forms of life that surround us, not one, excepting the dog, has made an alliance with us. A few creatures fear us, most are unaware of us, and not one loves us." Dr. Woodrow Wilson recently advanced the very interesting and novel theory that the dog, instead of having been domesticated by man, had in the beginning "adopted man into his pack." However this may be, it is a fact that the dog not only plays an important part in the domestic economy of man as the guardian of his home, his flocks, and his herds, but is also the companion of many of his outdoor sports, helps to provide for his larder, is the favorite of the rich and the consolation of the poor and, as Kipling says, is man's first friend.

Ancient literature and folklore contain many interesting legends of the dog, and even the oldest cuneiform tablets are not wanting in reference to him. Hanauer, in his Palestinian Animal Folklore, tells the following old legend of the origin of the hatred between cat and dog:

Once upon a time, when the world was young, to each and every kind of animal a duty was assigned. The dog and the cat were relieved from menial duty, because of the faithfulness of the one and the cleanliness of the other, and a written document was given them in attestation thereof, and the dog took charge of it. He buried it where he kept his stock of old bones, but this privilege of exemption so roused the envy of the horse, ass, and ox that they bribed the rat to burrow underground and destroy the charter. Since the loss of this document the dog has been liable, on account of his carelessness, to be tied or chained up by his master, and what is more, the cat has never forgiven him.¹

In England and in America the cult of the dog is so firmly established that it is unnecessary to catalogue his many virtues and admirable qualities in order to draw a crowd of worshipers to Islington or Madison Square during the sacred Four Days

¹ Semitic Magic, by R. Campbell Thompson.

of the Dog. It was quite fitting therefore that here in transplanted America a fane should be erected to the dog, where devotees might turn aside from Carnival frivolities to do homage to man's faithful ally.

The Carnival Dog Show captured the public interest and from the start was a "howling" success. Everyone who saw it immediately became a convert and spread the fame of the dog sanctuary far and wide throughout the grounds. As a result the building devoted to *Canis familiaris* was thronged to its full capacity during the hours of exhibition and the show was universally voted the most interesting exhibit in the City of Momus. Nor did number outdo quality among those present. Bench and bar, society, Government, commerce, industry, and all other members of the community were well represented among the visitors.

Of the 189 distinct varieties of the domestic dog, 29 were exhibited at the Carnival Dog Show, as follows: Bulldogs, bull terriers, pit bull terriers, fox terriers, Irish terriers, black and tan terriers, toy terriers, harriers, Airedales, foxhounds, greyhounds, bloodhounds, deerhounds, collies, pointers, English setters, Llewellyn setters, water and cocker spaniels, St. Bernards, Pomeranians, chows; French, Spanish, and Chinese poodles; French bulldogs, chins, staghounds, and mastiffs. These varieties were subdivided into 39 classes, in most of which two prizes were awarded. Class 40 brought nearly all of the blue-ribbon winners into the judging ring and resulted in the award of a silver cup to Mr. Chas. A. McDonough's bulldog Arguide for the best dog in the show, and of a similar cup to Dr. J. A. McKinnon for his bulldog bitch Maggie for the best bitch exhibited. In addition to this, the following four prize-winning dogs were very highly commended in this class: Mr. John Kennedy's Airedale dog Dick, Mr. J. L. Prendergast's bull terrier bitch Lady, Mr. A. W. Yearsley's collie dog Silver Dollar, and Mr. Leonard Dyson's fox terrier Spot. The smallest dog exhibited was Mr. Max Drusiedt's Chinese poodle Gustav, which, though nearly two years old, was no bigger than a good-sized rat and would hardly have made a good mouthful for the largest dog exhibited, Mr. T. M. Beech's St. Bernard Duke.

One of the results of the dog show has been the organization of the Philippine Kennel Club, of which the Governor-General is honorary president and the Secretary of the Interior active president. The purpose of this club, stated in broad general outline, is to improve the quality and endeavor to reduce the quantity of dog life in these Islands. It will work for the general uplift of the dog. It will hold annual or semiannual dog

shows and offer prizes for the best exhibits. It will gather and distribute for the benefit of its members and of the general public useful information regarding the dog in health and disease. It will issue certificates of dogs registered by it. It will make every effort to have in Manila a market for blooded dogs where buyers from surrounding countries can buy dogs that have been bred to withstand the effects of the climate.

It is the general impression that the dog is an inhabitant of the cold and temperate regions and that he rapidly degenerates in the tropics. Undoubtedly this is true, but much can be done to overcome the effects of tropical conditions by careful and scientific treatment. It will be interesting to note the results of a series of experiments among the members of the club during a number of years in the treatment of disease and in the breeding and rearing of young puppies.

The greatest enemies of the dog in this country are external and internal parasites, which are preventable. Other causes of his rapid degeneration are lack of exercise and improper feeding. A little genuine sympathy for the dog in his afflictions and a little active help will perform wonderful results in ridding him of his enemies. There can be nothing more important than ridding him of intestinal parasites, and a dog should be given a proper dose of powdered areca nut, santonine, and castor oil and made to fast twenty-four hours after the dose, at the very least five or six times a year, whether he shows any evidence of having these parasites or not.

In breeding it is well to have in mind that the sire is mainly responsible for the external structure, configuration and outward characteristics, also the locomotive system or development, while from the dam the pups get their internal structure, vital organs, constitution, temper, and habits in a greater proportion than from the male parent. It is also true that the purer the race of the parent the more certainty there is of its transmitting its qualities to the offspring. The parent of the purer descent will have the greater influence; and apart from certain disturbing influences the male, if of pure descent and descended from a stock of uniform color, will stamp his color upon his offspring.

These conclusions regarding breeding were arrived at by an English breeder of the first rank and have been often quoted approvingly.

SILK CULTURE IN THE PHILIPPINES.

By Dr. CHARLES S. BANKS,
Government Entomologist.

Few industries at the present time mentioned or advocated in the Philippines offer such inducement to the serious minded, who would at the same time find a safe method for employing a small amount of capital and a vocation which from its character is pleasant to follow, as the raising of silkworms and the subsequent conversion of the cocoons into a product ready for an immediate local market.

Unlike hemp, with the uncertainty of hands for its harvesting, the uncertainty of a disposition on the part of local buyers to purchase at a fair figure, the uncertainty of transportation from the more remote centers of production and the vastly more important uncertainty of a steady foreign market, the amount of silk which could be produced in the Philippines during the next score of years would find ready consumers in the makers of jusi and other native fabrics into the manufacture of which there enters annually more than ₱200,000 worth of raw silk, imported for the most part from China.

It is a well-known fact that silkworms and mulberry trees were introduced into these Islands some three hundred and seventeen years ago and that while the raising of silkworms died out more than one hundred and twenty-five years ago, the mulberry found the soil and climatic conditions so much to its liking that it has now become naturalized in all parts of the Islands and grows practically as an indigenous plant.

This plant does not require for its best development that quality of soil and that degree of cultivation which must be given to such plants as tobacco, coffee, rice, or sugar cane, and there are vast tracts of land in all parts of the Archipelago which are now lying idle and which could be profitably planted to mulberry, provided means were at hand for the irrigation of the mulberry plantations. The picture comes to mind of the extensive areas in Occidental Negros which can not be put to sugar

or hemp, but which would produce the finest quality of mulberry leaves.

Aside from the question of land, few legitimate industries in any country to-day require for their inception and maintenance a smaller outlay of capital than does silk culture. It is not the intention in this article to enter too minutely into the question of "kilos per hectare" or the relative cost of production in the various provinces or islands as influenced by the daily wage prevailing in given localities, but only to give some general idea of the average cost and profit based upon the experiment and practice here and elsewhere.

Mulberry trees may be planted 3 meters apart each way so that from 1,000 to 1,100 would occupy approximately 1 hectare, making allowance for rocks and other obstructions. Twenty healthy, robust trees two to four years old should feed from 30,000 to 40,000 silkworms. The cuttings should be made from trees which are not less than three years old, preferably from those of five years or more. These cuttings, which need not be over 3 decimeters in length, should be planted in nurseries and well watered, the best time for making and planting cuttings being just before the rainy season. As soon as the new shoots are 3 or 4 decimeters high the young plants may be set out.

It is not wise to manure ground on which mulberries are to be planted, as too much manure in the soil tends to make the leaves inferior for silk production.

If the soil be kept loose for a half meter around the trees and plenty of water be furnished during the dry season the plants will do well. The matter of tree planting is stated somewhat more explicitly here as it is most important that we get a good plantation started before we think of attempting to raise the silkworms.

All the experiments in silk culture carried on at the Government laboratory have been performed with trees which have been more or less scattered over the city of Manila, but sufficient work has been done to enable us to estimate the quantity of leaves that one may expect from a given area.

Calculated upon a basis of 20 trees for 35,000 worms, a hectare should support conservatively 1,750,000 to 2,000,000 silkworms. Two million silkworms produce about 1,300 kilos of cocoons, 12 per cent of which will be good raw silk, or say 150 kilos. This at a minimum of ₱8 per kilo indicates at the lowest possible figure ₱1,200 as the gross proceeds from a hectare of land.

I am aware that this figure is about the lowest one we need use in the calculation and am sure that with proper management a hectare should yield 30 to 40 per cent more than this.

The silk exhibit at the Carnival of 1910 was intended to show the visitors the whole process of silkworm raising up to and including the reeling of the silk by machinery. One can easily imagine that the most essential thing in silk culture is absolute cleanliness on the part of those engaged in caring for the silkworms. Without this every other effort or precaution would be vain, and no one should undertake the work who is not thoroughly prepared to carry out this programme of cleanliness. Everything connected with buildings, racks, trays, and attendants must be scrupulously clean, otherwise there is a serious likelihood that some form of disease will get into the silkworm colonies and carry them off faster than cholera could carry off human victims.

Experiences of growers in France, Japan, Italy, and other countries have taught us that it is impossible to put too much stress on the question of proper sanitary measures in silk culture.

For the proper care of the silkworms some form of camarine in which there may be afforded protection from sun, wind, rain, ants, mice, etc., must be provided. Such camarine need not be of expensive construction, in fact it need be little more than a shed with sinamay netting for the sides and with suale screens to be used in time of baguios.

The racks must, of course, be protected against ants and mice, which are the greatest enemies of the silkworms.

In order that the silkworms be protected from too strong light, the roof should come down to within 2 meters of the ground.

Those who saw the silk exhibit at the Carnival had a chance to observe the quality of the spun fiber and of the cloths that have been woven therefrom. They can not doubt but that the fiber shown is at least the equal of any that is at the present time imported for the manufacture of jusi and other cloths.

It must not be supposed that every silk plantation must have a piece of machinery such as that run at the Carnival; indeed, the most feasible plan would be to use small hand reels which could be distributed among the houses on the plantation and used to better advantage by the women and girls.

If large silk plantations were started, it would be perhaps better to have a central depot where all cocoons could be brought to be spun by machinery, but the other method would undoubtedly be cheaper, while the results would not be as uniform as to grade of silk and size of strands.

As this article only purports to give an idea of the possibilities of silk culture and not all the details, those who might be



PLATE VII.—THE BARTHAUD SILK MACHINE.

more particularly interested would do well to apply to the Entomologist, Bureau of Science, Manila, for more explicit information.

Twenty-six generations of silkworms have been raised in the Philippines in the past three years, and it is gratifying to be able to state that at no time has there appeared any sign of disease.

The above statements refer to the silkworms fed upon mulberry leaves; but before closing this article it might be well to state that there is another species of silkworm, a kind called "Eri" which feeds upon the leaves of the castor plant (*tañgantangan*) and which furnishes the silk known variously as "Tussar," "pongee," etc.

This silk, while inferior in some respects to the true mulberry silk, has many advantages in a country like the Philippines where so much of the fiber and cloth used is imported.

Grown in the Tinguian and Ilocano regions this product of the "Eri" silkworm would soon enter into strong competition with raw cotton as a material to be used in the weaving of cloths for clothing, blankets, and other objects in which these people of northern Luzon so excel. It is used extensively in India, China, and other parts of the East. There is no reason why it should not find ready acceptance in these Islands.

The castor plant (*tañgantangan*) grows in all parts of the Archipelago as a weed. It can be quickly grown from seed, and a plantation of this in connection with a mulberry plantation would mean a source of revenue during the first two or three years before the mulberry trees could be used as food for the true silkworm.

Taken in its entirety, the outlook for silk culture in the Philippines is an exceedingly bright one for those who, as in other pursuits, have the necessary perseverance and who are free from that cantankerous pessimism that sees only disaster ahead of him who makes any kind of venture here.

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS.

By the Collector of Customs.

JANUARY, 1910.
IMPORTS.

Articles.	Units.	Manila.	Cebu.	Iloilo.	Jolo.	Zamboanga.	Balabac.	Davao.	Total.
Rice	Kilos	4,518,390	1,378,758	1,227,897	65,516	116,545	3,009		7,310,110
	Dollars	130,370	41,242	38,683	2,401	3,967	117		216,780
Beef cattle	Quantity	4,107	98	914	1	14			5,164
	Dollars	60,132	2,209	30,202	31	432			93,116
Hogs	Kilos			1					
	Value								
Eggs	Quantity	271,451		261	38	937			272,687
	Value	26,875		12	2	43			26,982
Sugar	Kilos	223,102	8,665	15,064	6,683	11,851	196		265,561
	Value	13,842	1,082	1,082	495	892	22		16,911
Coffee	Quantity	165,250	3,299	1,824	884	1,410	12		162,679
	Value	36,441	789	400	217	341	4		38,192
Cacao	Quantity	93,225							93,225
	Value								
Raw cotton	Quantity	23,366							23,366
	Value	1,373							1,373
	Dollars	252							252

EXPORTS.

Hemp	Quantity	Kilos	9,991,158	1,423,920					11,415,078
	Value	Dollars	949,531	157,383					1,106,914
Sugar	Quantity	Kilos	562,400	1,014,444					3,094,844
	Value	Dollars	26,495	518,000	59,250				227,345
Copra	Quantity	Kilos	4,464,174		137,451	249,478			4,851,103
	Value	Dollars	388,618		11,588	21,564			
Tabacco	Quantity	Kilos	1,072,390						1,072,290
	Value	Dollars	187,893						187,893
Cigars	Quantity	Thousands	15,466						15,466
	Value	Dollars	260,531						260,531
Cigarettes	Quantity	Thousands	2,816						2,816
	Value	Dollars	3,525						3,525

ILOILO SUGAR DATA.

By JOSÉ T. FIGUERAS, *General Broker, Iloilo.*

The arrivals of sugar in Iloilo from the fields and sugar mills during the month of January amounted to 157,995 piculs, most of which were firsts and seconds.

The market opened on the first of the month at 6 pesos 6 reales, at which price it continued until it went up to 6 pesos 6½ reales. On the 5th it was quoted at 7 pesos, but dropped again the same day to 6 pesos and 6½ reales, at which price it continued almost steady until about the 12th, when it went up to 7 pesos and gradually rose each day until the 15th, when it was quoted at 7 pesos and 2 reales. This quotation continued steady until near the end of the month; on January 27, the highest price for the month, namely, 7 pesos and 4 reales, was quoted; this price continued steady until the close of the month with every indication of a still higher quotation in the near future.

January shipments.

CROP 1909-10.

Date.	Vessel.	Destination.	Superior piculs.
January 5	Kaifong	Hongkong	18,853
January 17	Sungkiang	do	1,618
Total for January			15,471

Exports up to January 31 for 1909 and 1910.

[In piculs.]

To—	1908-09.		1909-10.	
	Superior.	Wet.	Superior.	Wet.
United States			18,400	
Japan	8,000	5,915	29,722	
China	132,059			
Total	140,059	5,915	48,122	

THE HEMP AND MAGUEY MARKET.

The following extracts which may interest producers are taken from Smith & Schipper's monthly report, dated New York, January 3, 1910.

MANILA.

Notwithstanding the small amount of business done in December, prices held very steady, and quotations at the close show practically no change except in the case of the very high grades, which have advanced about $\frac{1}{4}$ cent per pound. Good current has been sold at $7\frac{1}{2}$ cents, December to January and January to February shipment. April to May hemp has been sold at a discount from these prices. The market in Manila has held firm, and it has been reported that the dealers are storing their hemp in anticipation of better prices.

The total receipts for 1909 (subject to correction) are 1,273,000 bales, compared with 1,052,000 bales in 1908. The weekly receipts recently have been more moderate, and it seems to be the general opinion that we are likely to have smaller receipts this year than last—at least they are not expected to exceed 1909. There is apparently no surplus this year, and there is no doubt that the world can take care of just as much hemp in 1910.

Although London has ruled quite irregular during the month, the general tone of the market has been steady, and speculators have operated with caution. Even the prices put out by second hands have in only a few instances been under the quotations ruling here.

Quotations.¹

	March to April.	February to March.	January to February.	December to Jan- uary.	Afloat U. S.	Spot U. S.
F. E. A. quality -----	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$
Superior good current -----	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$
50 per cent over good current -----	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$
Good current -----	7 $\frac{1}{2}$ -7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$			
75 per cent over fair current -----	7 $\frac{1}{2}$ -7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$			
Midway hemp -----	7 $\frac{1}{2}$ -7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$	7$\frac{1}{2}$-7$\frac{1}{2}$	7$\frac{1}{2}$-7$\frac{1}{2}$	7$\frac{1}{2}$	7$\frac{1}{2}$
25 per cent over fair current -----	6 $\frac{1}{2}$ -6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$			
Fair current -----	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$
Superior -----	6	6	6	6	6	6

¹These quotations are in cents United States currency per pound.

SISAL.

This market has held steady at 6 cents spot and shipment, but the demand from the Eastern buyers has been very small.

MAGUEY FIBER.

Quiet and unchanged at $4\frac{3}{4}$ cents for No. 1 and $4\frac{1}{2}$ cents for No. 2, December to January or January to February shipment.

Latest cable advices from Manila, January 3, 1910.

	1909.	1908.	1907.
Cleared for United States since January 1 -----	744,000	468,000	402,000
Cleared for United Kingdom since January 1 -----	471,000	502,000	405,000
Receipts at all ports since January 1 -----	1,273,000	1,052,000	967,000

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the Director of the Weather Bureau.

JANUARY, 1910.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar. Iloilo.				Rice. Tarlac.				Tobacco.				San Fern. ando.	
	Albay.	Tacloban.																
	Tempera- ture.	Rainfall.		Tempera- ture.	Rainfall.		Tempera- ture.	Rainfall.		Tempera- ture.	Rainfall.		Tempera- ture.	Rainfall.		Tempera- ture.	Rainfall.	
1	26.6	21.1		7.9	26.9		27.0			24.6	25.6							
2	25.2	10.2	(*)	9.4	26.2		27.2			24.0	14.3	25.8						
3	26.5	17.7		6.6	26.4	0.5	26.1			22.8	1.8	25.3						
4	25.8	49.3		8.2	27.3		26.8			24.3	6.4	25.5	10.8					
5	25.8	27.7		5.6	26.6	4.6	27.3			24.0		27.0						
6	26.2	26.7		26.7			25.8			24.9	25.8							
7	26.5			1.3	25.4	2.3				23.6		25.4						
8	25.8	30.5		10.2	26.0		24.1			22.8		24.0						
9	26.1	8.9		7.3	26.6		26.4			24.1		24.4						
10	26.9			12.5	26.2		26.4			24.5		25.5						
11	25.7	22.6		3.6	26.7		26.2			24.6		24.5						
12	26.5			0.5	26.5	1.5	25.4			25.5		25.4						
13	26.4				25.9		25.4			24.6		24.5						
14	25.7			14.0	25.8		24.8			23.6	1.3	25.0						
15	26.4	13.2		2.0	25.5		25.2			22.7		25.0						
16	24.9	4.9		18.3	26.0		25.2			22.2		25.1						
17	25.5	1.6		3.8	25.7		24.4			23.5		24.2						
18	24.6	14.0		7.4	25.5	0.8	24.0			21.6	8.6	23.4						
19	23.9	161.4		61.9	25.4	3.1	24.8			22.2		24.0						
20	28.7	97.7		13.3	25.8	0.8	25.2			22.7		25.4	0.8					
21	24.2	18.1		10.9	26.6		26.6			24.9		25.6	23.1					
22	26.1	0.3		4.3	25.8		26.6			22.9	29.7	25.6						
23	26.8	7.1			26.0		26.6			23.8	9.9	25.8						
24	25.7	3.3		6.8	26.0		26.6			22.9	5.1	26.2						
25	25.6	6.9		22.9	26.0					22.0	21.4	24.4						
26	24.0	12.2		5.1	25.5		24.0			19.9	8.7	22.8						
27	24.6	2.3		46.0	24.3	7.6	24.8			20.9		23.2						
28	25.2	3.9		14.3	24.6		23.8			21.8		23.2						
29	25.3				5.6	25.2		24.6			22.8		23.0					
30	24.0	9.4		0.8	24.8	0.8	24.4			22.6	1.3	23.6						
31	24.3	65.4		29.1	25.6	3.0	25.3			21.6	1.3	23.5						

* The thermometers of this station were broken during the typhoon of November 6, 1909.

CROPS PLANTED AND HARVESTED AND CONDITION
OF SAME TAKEN FROM QUARTERLY CROP
REPORTS FOR THE QUARTER ENDING
SEPTEMBER 30, 1909.

Act 1898 requiring municipal presidents to give quarterly statistics of agriculture and live stock, referred to in Exhibit D of the January number of the REVIEW, went into effect July 1 last. This was new work for most of the presidents, so that considerable correspondence was necessary before their reports could be accepted. The tables of crops and range of prices in this number, it will be seen, are based on reports for the first quarter under the new law.

Municipal presidents are largely dependent upon the municipal councilmen for their information, the latter having shown a commendable interest in their new work, which largely consists of inducing the individual planters to keep them so promptly and fully posted that their reports can be turned in immediately after the end of each quarter to the president, as a basis for his report. It is now assured that in future the REVIEW will be able to publish tables with less delay than in the present case.

[NOTE.—Attention is invited to the fact that rice should be understood as being in the unhulled state. 75 liters=1 cavan; 63.25 kilos=1 picul; 46 kilos=1 quintal; 11.5 kilos=1 arroba; 0.4047 hectare=1 acre.]

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Agusan (report from 1 municipality):					
Rice	Good	Hectares. 150	Hectares.		
Abacá	do	10			
Coconuts (copra)	do				
Sugar cane					
Tobacco					
Corn	Good	50			
Albay (reports from 9 municipalities):					
Rice	do	2,885	15	27,000	Liters.
Abacá	do	268	6,490	1,516,735	Kilos.
Coconuts (copra)	do			286,270	Do.
Sugar cane	do	3			
Tobacco					
Corn	Fair	17	145	55,500	Liters.
Ambos Camarines (reports from 23 municipalities):					
Rice	do	9,107	101	149,325	Do.
Abacá	do	329	4,000	3,992,277	Kilos.
Coconuts (copra)	Good			245,600	Do.
Sugar cane	do	61	61	6,515	Do.
Tobacco					
Corn	Fair	62	132	39,750	Liters.
				195	

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Antique (reports from 11 municipalities):					
Rice	Good	12,105	Hectares.	Hectares.	
	do	17		490	422,250
Abacá	do			73	26,122
Cocoanuts (copra)	do				49,651
Sugar cane					
Tobacco					
Corn	Fair			425	478,950
Bataan (reports from 9 municipalities):					
Rice	do	2,878			
Abacá					
Cocoanuts (copra)					
Sugar cane					
Tobacco					
Corn	Poor	3	1,395	305,925	Do.
Batangas (reports from 16 municipalities):					
Rice	do	1,856	Hectares.	Hectares.	
	Fair	1		18,096	10,874,925
Abacá	do			66	8,981
Cocoanuts (copra)	do				1,581
Sugar cane	do				
Tobacco					
Corn				3,063	886,275
Bohol (reports from 21 municipalities):					
Rice	Fair	2,580	Hectares.	Hectares.	
	Good	66		31	45,375
Abacá	do				151,041
Cocoanuts (copra)	do				640,243
Sugar cane	Fair	11		18	30,486
	Good	100		14	26,082
Tobacco	Fair	1,094		3,787	2,737,950
Corn					Liters.
Bulacan (reports from 10 municipalities):					
Rice	do	16,159	Hectares.	Hectares.	
				18	13,500
Abacá					Do.
Cocoanuts (copra)					
Sugar cane	Fair	400		140	70,840
Tobacco					Kilos.
Corn	Fair	5		476	290,250
Cagayan (reports from 11 municipalities):					
Rice	do	1,343	Hectares.	Hectares.	
				2,410	3,436,500
Abacá					Do.
Cocoanuts (copra)	Fair				
Sugar cane	do	40		2	1,897
Tobacco					Kilos.
Corn	Fair	783		3,368	2,937,750
Capiz (reports from 23 municipalities):					
Rice	do	22,638	Hectares.	Hectares.	
	do	588		6,671	4,279,500
Abacá	do				164,450
Cocoanuts (copra)	do				300,437
Sugar cane	do	8		5	3,795
Tobacco	do	5		7	10,442
Corn	do	38		706	474,675
Cavite (reports from 7 municipalities):					
Rice	do	9,635	Hectares.	Hectares.	
	do	6		952	262,500
Abacá	do			75	18,975
Cocoanuts (copra)	do				2,214
Sugar cane	do				
Tobacco	do	62			
Corn	Poor	2		126	168,975
Cebu (reports from 28 municipalities):					
Rice	Fair	305	Hectares.	Hectares.	
	Good	65		1,240	1,512,750
Abacá	do			905	2,792,171
Cocoanuts (copra)	do				407,140
Sugar cane	do	25		25	6,325
Tobacco	Fair			407	311,696
Corn	do	5,690		28,552	50,523,450
Ilocos Norte (reports from 9 municipalities):					
Rice	do	13,492			
Abacá					
Cocoanuts (copra)	Good				
Sugar cane	do	199			
Tobacco	Fair			50	39,100
Corn	do	39		520	Kilos.
					Liters.

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Ilocos Sur (reports from 29 municipalities):					
Rice	Fair	Hectares. 20,889	Hectares. 4	6,750	Liters.
Abacá				3,605	Kilos.
Coconuts (copra)	Fair				
Sugar cane	Good	2			
Tobacco			10	11,040	Do.
Corn	Fair	141	2,303	4,150,800	Liters.
Iloilo (reports from 14 municipalities):					
Rice	do	18,387	997	705,000	Do.
Abacá	Good	5	15	6,451	Kilos.
Coconuts (copra)	do			23,339	Do.
Sugar cane	do	15			
Tobacco	Fair		146	207,460	Do.
Corn	do	38	3,896	1,637,175	Liters.
Isabela (reports from 2 municipalities):					
Rice	do	30			
Abacá					
Coconuts (copra)					
Sugar cane					
Tobacco					
Corn	Fair		294	442,050	Do.
La Laguna (reports from 8 municipalities):					
Rice	do	6,905	400	600,000	Do.
Abacá	Good	21	206	121,693	Kilos.
Coconuts (copra)	do			210,559	Do.
Sugar cane	Fair	44			
Tobacco					
Corn	Good	30	30	33,750	Liters.
La Unión (reports from 11 municipalities):					
Rice	Fair	17,401	10	6,000	Do.
Abacá					
Coconuts (copra)	Good			35,926	Kilos.
Sugar cane	Fair	42			
Tobacco	do		2	368	Do.
Corn	Good	52	918	543,000	Liters.
Leyte (reports from 16 municipalities):					
Rice	do	6,844	1,359	1,251,375	Do.
Abacá	do	1,127	7,358	3,317,273	Kilos.
Coconuts (copra)	do			348,002	Do.
Sugar cane	do	108	80	61,605	Do.
Tobacco	Fair	602	1,255	218,960	Do.
Corn	do	2,516	1,915	1,433,100	Liters.
Mindoro (reports from 3 municipalities):					
Rice	Good	240	136	256,500	Do.
Abacá			130	32,700	Kilos.
Coconuts (copra)	Good				
Sugar cane			1	258	Do.
Tobacco					
Corn			28	28,125	Liters.
Misamis (reports from 3 municipalities):					
Rice					
Abacá	Fair	95	624	188,348	Kilos.
Coconuts (copra)	do			142,046	Do.
Sugar cane	Good	4	5	12,350	Do.
Tobacco					
Corn	Fair	65	370	885,000	Liters.
Moro (reports from 6 municipalities):					
Rice	Good	1,502	371	748,650	Do.
Abacá	do	17	488	389,620	Kilos.
Coconuts (copra)	do			270,886	Do.
Sugar cane	do	12	22	14,105	Do.
Tobacco			3	1,794	Do.
Corn	Good	120	327	402,750	Liters.
Mountain (reports from 15 municipalities):					
Rice	Fair	3,671	279	426,300	Do.
Abacá					
Coconuts (copra)					
Sugar cane					
Tobacco					
Corn	Fair	2	144	77,775	Do.

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.			
			Area.	Quantity.	Unit.	
Nueva Ecija (reports from 17 municipalities):						
Rice	Fair	Hectares. 51,843	Hectares. 50	75,000	Liters.	
Abacá						
Coconuts (copra)	Good					
Sugar cane	do	11				
Tobacco						
Corn			1,072	1,149,600	Do.	
Nueva Vizcaya (reports from 2 municipalities):						
Rice	Good	572				
Abacá						
Coconuts (copra)	Good					
Sugar cane						
Tobacco						
Corn		2	1	750	Do.	
Occidental Negros (reports from 12 municipalities):						
Rice	Fair	8,487	120	90,000	Do.	
Abacá	do	207	96	8,159	Kilos.	
Coconuts (copra)	do			92,255	Do.	
Sugar cane	do	870	518	844,957	Do.	
Tobacco						
Corn	Good	275	1,118	1,005,375	Liters.	
Oriental Negros (reports from 9 municipalities):						
Rice	do	780	675	1,002,000	Do.	
Abacá	do	4,222	2,186	2,571,808	Kilos.	
Coconuts (copra)	do			274,315	Do.	
Sugar cane						
Tobacco	Fair	40	45	37,260	Do.	
Corn	do	2,472	2,944	7,960,950	Liters.	
Palawan (report from 1 municipality):						
Rice	do	55	159	155,025	Do.	
Abacá						
Coconuts (copra)	Good			3,795	Kilos.	
Sugar cane						
Tobacco						
Corn			13	7,125	Liters.	
Pampanga (reports from 17 municipalities):						
Rice	Poor	31,138	10	6,000	Do.	
Abacá						
Coconuts (copra)	Good					
Sugar cane	Fair	2,900				
Tobacco						
Corn	Fair	87	423	237,675	Do.	
Pangasinan (reports from 37 municipalities):						
Rice	do	91,191	24	28,500	Do.	
Abacá						
Coconuts (copra)	Good			104,615	Kilos.	
Sugar cane	do	150	2	632	Do.	
Tobacco	do	100	101	92,460	Do.	
Corn	Fair	188	1,481	836,700	Liters.	
Rizal (reports from 17 municipalities):						
Rice	do	5,736				
Abacá						
Coconuts (copra)	Good					
Sugar cane	do	150	2	632		
Tobacco	do	100	101	92,460		
Corn	Fair	188	1,481	836,700		
Samar (reports from 16 municipalities):						
Rice	Poor	219	347	74,025	Liters.	
Abacá						
Coconuts (copra)	Good	659	1,034	1,818,225	Do.	
Sugar cane	do	398	1,284	336,680	Kilos.	
Tobacco	Fair			348,128	Do.	
Corn	do	86	70	99,555	Do.	
	do	4	77	33,626	Do.	
	Good	88	253	146,700	Liters.	
Sorsogon (reports from 13 municipalities):						
Rice	Fair	248	1	2,250	Do.	
Abacá	Good	556	6,786	870,700	Kilos.	
Coconuts (copra)	do			67,994	Do.	
Sugar cane	do	17	32	23,276	Do.	
Tobacco	do			26	11,049	Do.
Corn	Fair	288	666	442,650	Liters.	

Crops planted and harvested, etc.—Continued.

Province and crop.	Condition.	Planted during quarter.	Harvested during quarter.		
			Area.	Quantity.	Unit.
Surigao (reports from 2 municipalities):					
Rice					
Abacá	Good	82	399	254,265	Kilos.
Coconuts (copra)	do			70,384	Do.
Sugar cane					
Tobacco	Good	10	20	4,140	Do.
Corn	Fair	150	70	5,250	Liters.
Tarlac (reports from 11 municipalities):					
Rice	do	18,137			
Abacá					
Coconuts (copra)	Fair				
Sugar cane	do	10			
Tobacco					
Corn	Fair	5	192	64,275	Do.
Tayabas (reports from 14 municipalities):					
Rice	Good	5,839	1,712	552,000	Do.
Abacá	do	1,355	3,679	1,190,744	Kilos.
Coconuts (copra)	do			1,521,668	Do.
Sugar cane	do	371	34	6,831	Do.
Tobacco	Fair	11	31	5,106	Do.
Corn	do	132	435	144,000	Liters.
Zambales (reports from 8 municipalities):					
Rice	do	13,160			
Abacá					
Coconuts (copra)	Good				
Sugar cane	do	2			
Tobacco					
Corn	Good		26	14,550	Do.

RANGE OF PRICES OF PHILIPPINE AGRICULTURAL PRODUCTS.

Highest and lowest prices of unhulled rice, abaca, copra, sugar, tobacco, and corn for the quarter ending September 30, 1909.

Province.	Unhulled rice per 75 liters.		Abaca per 63.25 kilos.		Copra per 63.25 kilos.		Sugar per 63.25 kilos.		Tobacco per 46 kilos.		Corn per 75 liters.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Agusan												
Albay	₱3.00	₱2.00	₱7.90	₱6.30	₱8.20	₱8.20	₱6.00	₱6.00	₱5.00	₱2.50	₱2.50	₱2.00
Ambos Camarines	4.50	2.50	11.05	5.72	12.00	5.00	4.75	8.00	2.20	4.00	6.00	1.00
Antique	3.12	1.50	12.25	5.00	9.50	7.70	5.00	5.00	3.00	2.50	5.00	1.00
Batangas	3.00	1.75	18.00	10.00	7.00	5.00	9.00	9.00	5.00	5.00	5.00	1.50
Bohol	4.00	2.25	12.00	5.00	7.00	5.00	3.00	3.00	11.00	6.00	4.00	1.80
Bukidnon	4.00	2.00	15.00	4.00	9.50	6.00	7.20	3.00	30.00	8.00	5.00	2.00
Cagayan	3.00	2.25	2.20	—	—	—	—	—	20.00	5.00	5.00	1.25
Capiz	3.80	1.50	15.00	6.00	10.00	4.00	4.00	7.00	17.00	7.00	4.00	1.25
Cavite	4.00	2.50	12.00	6.00	5.50	5.50	6.00	6.00	25.00	3.00	5.00	1.00
Cebu	4.50	2.25	16.00	8.00	11.50	6.00	8.00	8.00	16.00	3.00	5.00	1.75
Ilocos Norte	3.75	2.00	2.00	—	—	—	—	—	30.00	3.00	4.50	2.00
Ilocos Sur	3.75	2.00	2.00	—	—	—	—	—	20.00	4.00	3.00	1.50
Iloilo	3.60	1.50	18.50	14.00	10.00	10.00	7.00	7.00	2.50	5.00	4.00	1.50
Isabela	3.00	3.00	1.50	—	9.30	6.00	8.00	8.00	5.00	5.00	5.00	2.25
La Laguna	3.20	2.40	12.50	6.00	8.00	5.00	6.50	4.00	21.00	15.00	4.00	4.00
La Union	3.75	2.20	12.50	—	7.00	4.00	5.00	5.00	18.00	10.00	5.00	3.00
Leyte	1.50	1.50	12.50	—	8.75	8.50	4.00	8.00	2.50	10.00	4.85	4.75
Mindoro	5.00	2.50	12.00	10.00	5.00	5.00	5.00	5.00	30.00	10.00	3.50	1.50
Misamis	3.75	2.50	9.00	6.95	9.50	7.60	4.00	4.00	7.50	5.00	4.00	2.50
Moro	4.00	1.50	14.00	6.60	9.00	7.00	7.50	4.12	25.25	2.50	2.50	2.50
Mountain Province	8.00	3.00	1.25	—	10.00	5.00	6.00	6.00	3.50	30.00	4.00	2.50
Nueva Ecija	3.75	1.25	—	—	7.00	8.00	4.00	4.00	30.00	5.00	3.75	1.00
Nueva Vizcaya	3.00	2.45	—	—	—	—	—	—	17.00	3.00	3.50	1.50
Negros Oriental	3.50	2.75	12.00	7.00	10.50	6.00	7.62	4.00	23.00	6.50	3.50	1.50
Palawan	4.00	2.25	12.00	6.00	9.80	6.50	6.00	4.50	25.00	4.75	5.00	2.50
Pampanga	3.50	2.50	11.00	6.00	5.00	5.00	8.00	8.00	25.00	20.00	2.00	1.50
Pangasinan	4.50	1.50	—	—	8.00	4.50	8.25	4.00	92.00	4.50	5.00	1.25
Rizal	3.50	2.00	18.00	—	8.00	—	8.00	8.00	—	4.00	4.00	2.00
Samar	4.00	2.00	13.00	6.00	8.00	5.00	8.00	4.00	20.00	5.00	4.00	2.00
Sorsogon	3.50	1.50	16.50	7.50	4.50	8.25	3.50	30.00	20.00	3.00	3.00	1.50
Surigao	3.00	1.75	11.50	9.00	8.75	7.00	8.00	8.00	30.00	9.00	2.00	1.50
Tarlac	2.00	—	2.00	—	—	—	—	—	20.00	9.00	3.00	1.25
Tayabas	3.25	2.50	18.00	6.00	7.00	4.50	7.00	4.00	25.00	6.00	3.00	2.00
Zambales	2.50	1.75	—	—	5.00	5.00	4.00	4.00	12.50	12.00	5.00	1.50

PERIODICALS IN THE LIBRARY OF THE BUREAU OF AGRICULTURE.

Everyone interested in the study of tropical agriculture is invited to visit the library and make use of these periodicals.

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 Tamil Journal of South India Agriculture, Madras, India.
 Station Agronomique, Port Louis, Colony of Mauritius.
 Journal d'Agriculture Tropicale, Paris.
 Boletim do Museu Goeldi, Para, Brazil.
 O Fazendeiro, Sao Paolo, Brazil.
 Boletim de Sociedade de Geographia de Lisboa, Portugal.

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(Spanish.)
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(Spanish.)
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- No. 11. The Jute Industry. (Spanish.)
- No. 12. Abacá. (Manila Hemp.) (English.)
- No. 13. The Cultivation of Maguey in the Philippine Islands. (English and Spanish.)
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- No. 1. Maguey. (English, Spanish, Visayan, Cebuano.)
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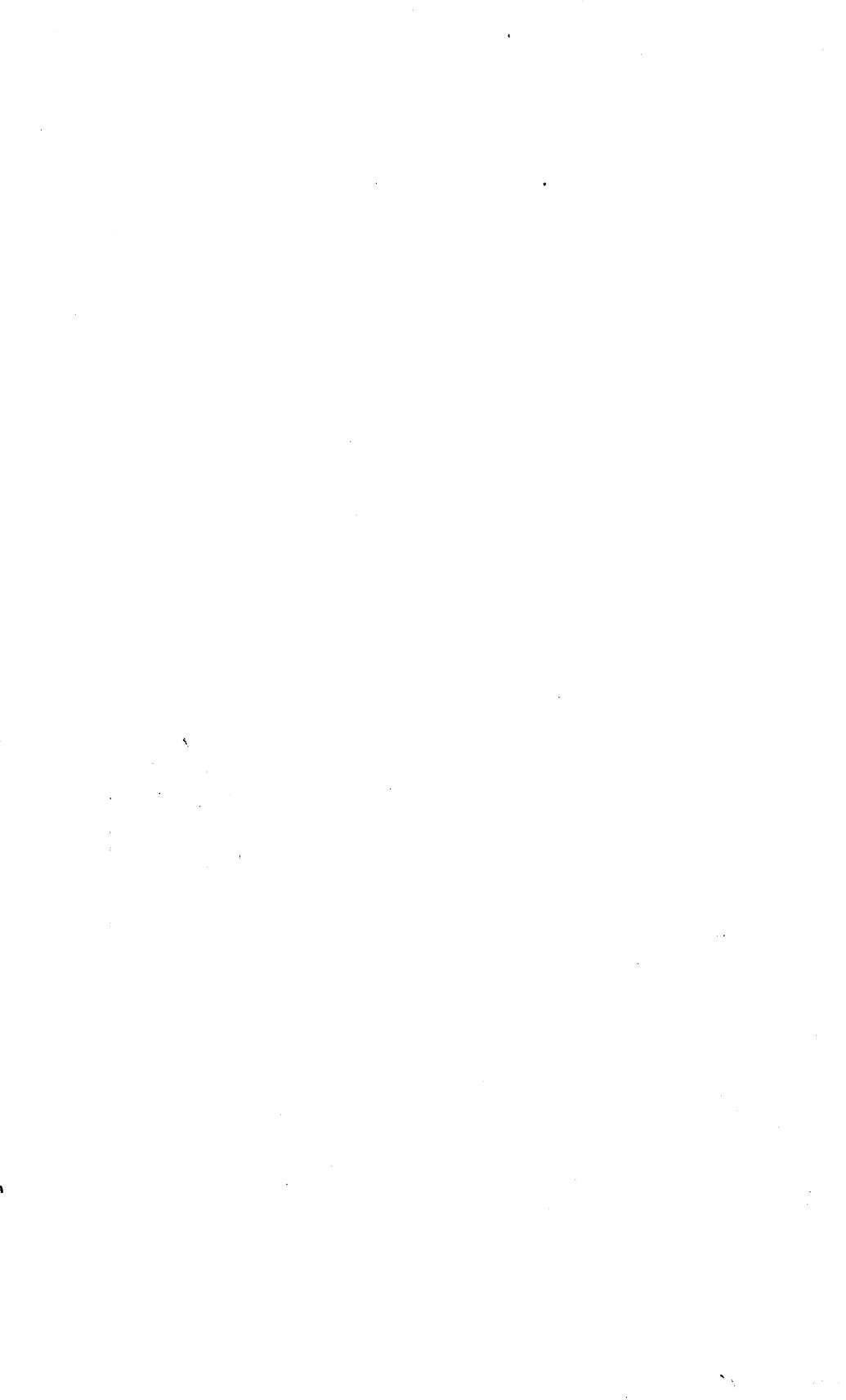
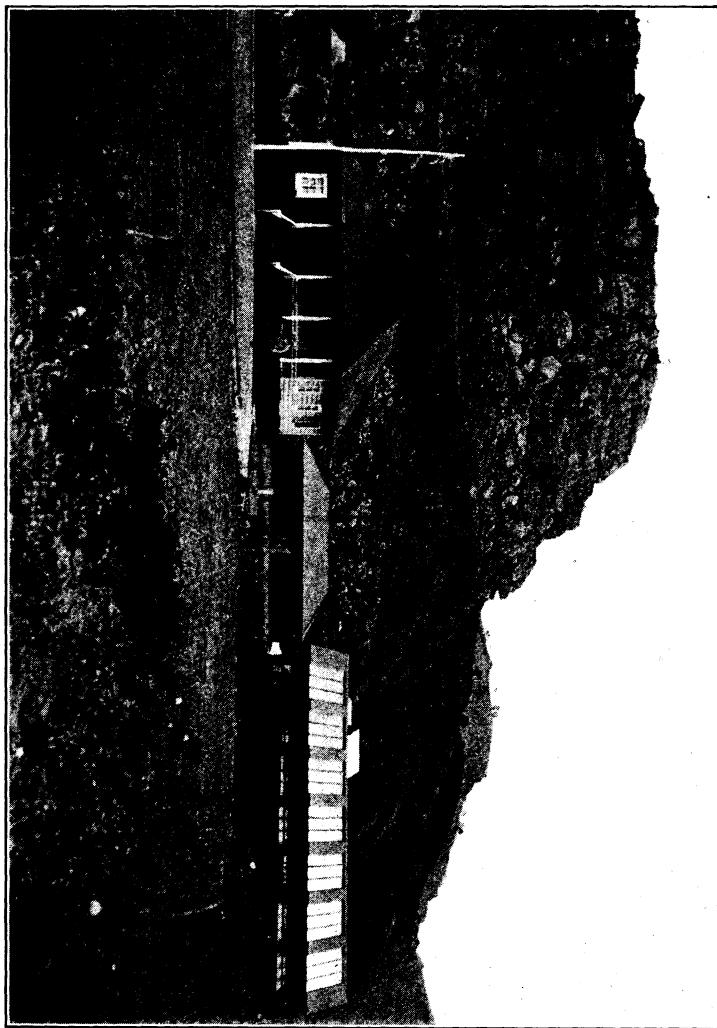


PLATE I.—A GENERAL VIEW OF THE BAGUIO EXPERIMENT STATION.



THE PHILIPPINE

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EDITORIAL.

MR. ARTHUR F. BYARS, AGRICULTURAL INSPECTOR.

Mr. Byars's untimely death from typhoid fever, which was unexpected by nearly everyone except his attending physicians, took place at the Civil Hospital Thursday evening, March 17, 1910.

Arthur F. Byars was born September 19, 1885, in Cherokee County, South Carolina. He was educated in the graded schools of Marion, South Carolina, where he was graduated and received a diploma. After his graduation he returned to the Marion schools and did one year of graduate work. In September, 1903, he entered Clemson Agricultural College as a sophomore, where he began the work of his chosen profession. During his college course Mr. Byars specialized in dairying and animal husbandry; and on June 12, 1906, was granted the degree of bachelor of science. On April 19, previous to his graduation, he took the United States civil-service examination for scientific assistant at Greenville, South Carolina. On this occasion Prof. J. N. Harper, of Clemson Agricultural College, stated that he ranked high as a student of agriculture and was very thorough in his studies and his work. Prof. John Michels, of the same institution, spoke of him as a very conscientious and industrious student. Mr. Byars was passed and placed on the United States civil-service register July 27, 1906. He was appointed an assistant agricultural inspector in this Bureau February 9, 1908, promoted to agricultural inspector on October 1, 1908, and again promoted on October 1, 1909.

His entire service in this Bureau was marked by a high degree of efficiency and a most praiseworthy interest and enthusiasm in his work. The Bureau of Agriculture by the death of Mr. Byars loses one of its most efficient and trusted employees, and his fellow-workers and associates a friend whose memory will be cherished and whose loss will be deeply mourned.

THE REVIVAL OF INTEREST IN AGRICULTURE.

From different parts of the Islands word is reaching Manila that there is a decided revival of interest in agriculture manifested by the people in the country. For years many of the large landowners who were engaged in farming in Spanish times have been practically idle. Now many of them see in present conditions the promise of renewed prosperity. Some

are buying new machinery, many are buying work animals and looking for help to cultivate their lands that they may share in the large profits which present prices promise to sugar producers, tobacco raisers, and coconut and hemp growers, to say nothing of the possibilities for growing rubber, coffee, cassava, and other crops.

From the Cagayan Valley we hear enthusiastic reports regarding the tobacco crop for next year of large areas of land adapted to growing tobacco, which offer a rich reward to those prepared to take up this line of farming. Enthusiasm over the prospects for tobacco farming is not confined to the Cagayan Valley alone, but a great deal of interest has been manifested in the tobacco-growing business in Ilocos Norte, Union, Capiz, Iloilo, Occidental Negros, and several other provinces.

From the sugar sections of Negros, Iloilo, Antique, and Capiz, reports indicate that there will be a decided increase in the amount of land planted to sugar cane this year. Bulacan, Pampanga, and several other provinces are preparing to share largely in the profits in consequence of the high price of sugar. Several new sugar plantations have been established. More than this, we have an object lesson in the investment of millions of pesos by two large sugar-producing companies, demonstrating the faith of sugar experts in the possibilities of other sections of the Philippines than those to which we have been accustomed to look as centers of the sugar industry. These two companies, we believe, will establish model sugar plantations with up-to-date equipment and machinery equal to that found anywhere in the world, so that those who desire may see and learn for themselves of the possibilities when this industry is carried on in accordance with the most modern methods.

From Ambos Camarines, Misamis, and other sections comes word that many of the people are turning their attention to the cultivation of land which has for years been lying idle, and planting rice, corn, camotes, coconuts, and other crops. In Bataan, Cebu, and other provinces, farmers' associations are being formed to protect the interests of agriculturists. In Manila the three buildings of the College of Veterinary Science have been finished, and in Bacolod an agricultural school building which cost ₱10,000 has been completed.

While these signs indicating confidence in the future peace and prosperity of the country are coming from nearly every section, we have from those responsible for the Government such guarantees to investors as a reform in the land system, which will give to owners of land titles to their holdings in the easiest

possible manner and with the least expense consistent with security to the Government and the interests of the people as a whole. The Government is granting tobacco bounties to a larger number of provinces, encouraging the growing of more and better quality of tobacco. The sale of Government lands in sections of the country that are now practically idle to companies which have sufficient capital to demonstrate the agricultural possibilities of these sections will be of inestimable value in demonstrating the extent of the resources of the Philippine Islands, not only to their own people, but in showing to other countries the importance of Philippine resources and the place these Islands should take in supplying products for the world's trade and commerce. With the facilities for transportation between our commercial centers and the centers of production keeping pace with the facilities for transportation between these Islands, east and west, to America and Europe, which are the two great world centers for commerce; with Manila being made a port which actually attracts ocean travel and therefore the great steamship companies of Europe, America, and Asia, it would seem that the days of prosperity for the Philippines are not far distant.

EXTRACTS FROM THE ADDRESS OF THE GOVERNOR-GENERAL AT ZAMBOANGA.¹

I am sorry that none of the distinguished Filipinos who have come here to greet me to-day have presented any suggestions or arguments touching any of the real points at issue in this province; that they have not shown me how I can assist them in bettering their condition by increasing the prosperity of the province. The real problem before the Philippine people is not their political status; that is fixed both here and in other parts. The real problem is the industrial development, and by industrial I mean agriculture, manufactures, and commerce. What we want to do is to increase the products of the Islands, and my advice to this distinguished gentleman who has been talking to us, and to his friends and other people who have been thinking about political changes, is to get busy and devote their attention to the practical questions confronting us—things for which there is something to be done. I have come here to do what I can to help the people to better their condition, to increase the products of rubber, hemp, coconuts, sugar, tobacco, lumber, and other things by which money can be made. I want to have, when I come again, Filipinos crowd round me and present suggestions of ways to enable the people to live better, have better houses, better food, and better clothes. No change in the civil status of the government will do that. The government is good enough now; it is all right. To those of you who doubt whether it is a civil government or not, I wish to state that the present government of the Moro Province is purely civil; that General Pershing, although he holds military rank, is a purely civil official in so far as he is governor of the province. He reports to the civilians in Manila and to the Civil Commission and not to the Commanding General in Manila. I am also happy to inform you that I have found that General Pershing and I are in complete accord; that our views are the

¹ Address before residents of the Moro Province at Zamboanga, March 9, 1910, as reported by the Mindanao Herald of March 12, 1910.

same; that we have agreed upon the policy which we will pursue, and anything he says may be taken as being an exact expression of my ideas.

I liken the improvement of Manila and the means of communication coming in and out of Manila to making sure that the heart is all right. Manila is the heart of the whole Archipelago. I am speaking now commercially. Getting the valves and veins and everything working right in the heart will stimulate the movement of that part, which will throw the blood strongly, making it reach every part of the body, to the benefit of the whole. For that reason I think we can not devote ourselves too carefully—and I have devoted my attention to this for the last five years—to making sure that we can handle goods in Manila cheaper than in other places. I want it to compete favorably with the ports of Hongkong, Singapore, and the other ports of transshipment. We have no harbor dues; we have very low wharf dues and that sort of thing. The figures which were presented to me by the Collector of Customs for the amounts to be charged for the use of wharves I cut in half, although he said he could not cover operating expenses. I told him that we have got to have the port running at a low cost to shippers. I want them to know that the cost here is less than elsewhere. He pointed out that the figure he suggested was about one-half that of other places and one-fourth that of New York. Nevertheless, we cut his figures in two. We want to make the Philippines a place where the captains will all say, "Take me to Manila." Heretofore, when I came out here, and I believe the practice still exists in some ports, officers of the steamships would try to avoid coming to the Philippines.

We have recently appointed a committee in the Commission to care for the affairs of the Moro Province. The chairman of that committee is the one American Commissioner without a portfolio. He has more time than any of the others, and I have suggested to him that he take the place of the man who is going to follow up the interests of the Moro Province in each bit of legislation that comes up; that he be the representative of the Moro Province in Manila. He is the Hon. Frank A. Branagan, formerly Treasurer of the Islands. Another member of that committee is Justice Elliott, who has taken my position as Secretary of Commerce and Police, and the third is the Hon. Rafael Palma, one of the Filipino members of the Commission.

THE NEED OF FARMERS' ASSOCIATIONS AND WHAT THEY SHOULD DO FOR THE DEVELOPMENT OF AGRICULTURE.¹

By Hon. RAFAEL PALMA.

It is a singular privilege for me, and one of which I am proud, to speak before a congregation of men engaged in such an old and honorable profession—before the farmers of this country, upon whom rests its future welfare. Farmers constitute everywhere the powerful propelling force behind national wealth; and in our country, essentially agricultural, they represent, as in the human skeleton, the backbone which sustains and binds the human structure. You, as farmers, have the most honorable occupation of any men in the world. Your efforts and struggles are not only to feed your own countrymen, but to send to other parts of the world the products which are needed there. Your life has perhaps less excitement and novelty than others, but it is more useful and profitable for mankind.

Our country has so far depended almost entirely upon agriculture. So when agriculture undergoes some of the adversities which occur so often in tropical countries on account of the uncertainties of the weather, all the country suffers, so that it is like a man mortally wounded, from whose veins the life blood is streaming. Even the public revenues suffer a visible depression. In better years, when the crops are abundant, everyone breathes easily once more. We depend absolutely upon agriculture. This is the reason why I think that any time and attention given to the study of questions related to agriculture are most profitable for the community at large.

Since the Payne Bill has inaugurated in our country a new era, which I should call one of economic revolution, agricultural problems have attained a double importance. However, I shall not consider these problems now; I shall limit myself

¹ Address delivered by Hon. Rafael Palma at the Agricultural Conferences held during the Carnival, February 7, 1910.

to stating my opinion regarding the important duty to be performed by our farmers, and the responsibilities to be accepted by them in view of our new situation.

Our agriculture has experienced many adversities during these last few years. Rinderpest, drought, locusts, frequent baguios and inundations, all these evils, together and separately, have contributed to make a situation very different from the one we should desire. But, in looking into the causes of the unsatisfactory condition of our fields, we ought not to blame Providence or the Government only, as so many are inclined to do, but we must also ask ourselves whether we have done everything in our power to relieve our own situation and find a remedy for our present afflictions. Those who believe that the Government or Divine Providence will do everything deceive themselves. They must attain salvation by means of their own efforts, and above all in combined efforts.

The easy and comfortable life of the old times is no longer possible. Our standard of living through contact with American civilization has been quickly raised, and it is our duty to rise to the height of the present opportunity. If we remained stationary it would mean our annihilation, while if we make a strong effort to introduce modern habits by adopting the methods of the most advanced countries it will not only result in agricultural progress, but secure for us an economic future vastly superior to the present condition.

Agricultural instruction in the old days followed old and routinary methods. Our farmers used to be satisfied with the results of their individual efforts, and did not take into consideration the advantages to be obtained by coöperation for the purposes of common benefit. The few requirements of our old style of living were met with little effort, and the small value set upon the comforts and pleasures of life made people indifferent about obtaining them. With few exceptions our farms have been cultivated with implements which save neither time nor the cost of production. The harvesting of many of our staple crops has been almost always accompanied by considerable losses in quantity and in quality. This, to a certain extent, was because each farmer relied upon his own capital and help; and, though we have to acknowledge that there were individual successes, when we behold the general picture we have to admit that in spite of the abundant and beneficent natural conditions in which we happened to be born and live, our agriculture is far behind that of other neighboring countries.

Our farmers can not and ought not to remain any longer in individual isolation if they aim at greater material advantages for themselves and for their country. The great centers of light in the West are turned toward the East, and we must shake off the lethargy which has dominated us for centuries in order to face this light squarely.

We must not be ashamed because of our present material backwardness, for which only a little part of the blame falls upon us, but we must, at once, look for a remedy with understanding, foresight, and energy, in order to develop and rapidly increase our material wealth as a firm and solid foundation for our growing national power.

The formation of organizations amongst farmers is most necessary to promote the development and rapid improvement of our agriculture. They must unite their efforts and be allied in everything connected with common necessity or aspiration. In the division of labor which distinguishes complex modern life each group of men with the same necessities and aspirations must be organized for their own protection, help, and defense.

Individual effort can obtain some small successes, but the great ones are reserved to the organizations. It will not be possible to root out the inveterate vices and faults of our system of agriculture without the combined effort and organization of farmers. The extensive lands of our country which are uncultivated, and those so poorly cultivated that the crops are practically confided to the hazards of the weather and to the natural fertility of the ground, without the help of the improved processes of modern agricultural science, offer the most dismal proof of the shortage of means and individual efforts for the general and thorough development of the agricultural resources of our country.

I am glad to point to the fact that, in many ways flattering to native pride, steps have been taken in Manila and in the provinces for the formation of organizations among agriculturists. The Agricultural Association for Negros and Panay, the Pampanga Sugar Association, and associations to be found in other provinces foretell the first signs of our awakening to economic modern life, promising in the near future a strong reaction toward the source of our wealth and days of fuller prosperity and greatness to our country. Each province, each region, in which the same products prevail, must organize its association. Central and local associations must be organized in order to obtain more advantageously the common benefit. It

will be most important to constitute these associations on practical and solid foundations, and to choose farmers who are able, intelligent, and faithful to their duties to manage them and carry out their true purposes.

These organizations will be very useful in promoting sympathy, love, and united strength among those who devote themselves to the same kind of work or trade. The encouragement of such feelings will necessarily result in the generous moving of the heart which makes everyone ready or inclined to extend a hand to the friend or brother in time of trial or failure which may occur. By means of these organizations information on the selling price, the condition of markets, the invention of new machines, etc., can reach a greater number of men, so that each one can make his calculations according to his particular advantage. The exchange of ideas and experience, which is impossible when each one shelters himself behind his individual interest, will be stronger, so that one will profit by the help of another, and through it the general interests will experience a vigorous impulse toward growth and progress.

It is not well that man should be shut up in an unreasonable selfishness to pay attention to his particular gain only; he must show the same interest for his country's wealth as for his own. Man ought not to forget that he is a citizen of his country, and civil duty requires him to extend to his neighbors the benefit of his discoveries and experience.

In the first place, these organizations must try to profit by the processes indicated by science in order to maintain and improve the fertility of the soil and make use of modern implements for the plowing of the ground and improvement of cultivation. The reduction of time and space, as well as of the cost of production, by introducing machinery and mechanical appliances have been proved in other countries. We are fortunate to be able to take advantage of the results of such experience, acquired by such countries in the course of years and centuries. The use of scientific processes and of agricultural machinery on the lands which need them will not only place a more abundant production in the hands of the farmer, but also a greater return for the capital invested. The rule of obtaining the greatest production with the greatest possible economy is well established, and must be observed and practiced by the Filipino farmer.

In the second place, these organizations will also do much good if they try to extend the planting of certain products not well exploited yet, to extend and better the quality of those

already known, which may be more remunerative under more favorable circumstances, and to introduce and encourage the cultivation of several crops in one field. The Bureau of Agriculture with its acquired experience is always ready to furnish the best information concerning crops little or not at all exploited, the cultivation of which is recommendable in this country on account of the advantageous prices they meet in foreign markets. The farmer must not be satisfied with one kind of crop, and it is necessary to recommend to him a diversity of crops, in accordance with the conditions of the ground, in order to face the setbacks which each product has to undergo necessarily and periodically. The sudden fall in price of a special product can cause impoverishment or ruin, as has recently happened to some abacá planters. It will be prudent to recommend to him also the cultivation of the necessary products which are to be consumed at home and by the farmers and other laborers, as it constitutes an excellent help for his own plantation. But the beneficial action of these organizations can be specially demonstrated in the help they can give to the association in order to extend and better their respective crops. For not every farmer has at his disposal the required capital to buy the necessary machinery to plow his land or better his crops, while the organization of several farmers can raise the funds necessary for the purchase, and the association through a lease or other contract will be able to give to the members for some time and at stated times the use of such machinery.

There is a continual and widespread complaint against the kind of stock-jobbing and exploitation to which our farmers are subjected by the merchants and their agents. Organizations among farmers can, to a great extent, root out this pernicious practice by means of intelligent coöperation among the members, preventing the bad but common mistake of borrowing money on their future harvests, and by adopting such measures as will permit them or their agents to place the products on the market or where the price is higher. It is not wise to exclaim continually against the abuses of usury and exploitation, when by our indifferent behavior we are really accomplices and docile instruments of these abuses. An agriculturist of a province near Manila told me the other day that there was a difference of ₱2 per picul in the price of sugar between Manila and his town. The freight per picul was, as he told me, ₱0.50 only. And though this fact was very well known to him he preferred losing ₱1.50 per picul selling it in his town instead

of bringing it to Manila. It is certainly surprising that sometimes, knowing of such misusages, we do not put an end to them by means which are at hand, instead of passing them by with indifference.

There is much to be done in the way of stimulating and improving the condition of laboring men. It will be a relief to see these organizations concerning themselves with the needs and education of that numerous group of workmen who by their hard labor and struggles contribute to production. It will be necessary to inculcate in them, by means of these organizations, the idea of seriousness and exactness in the performance of their duties and obligations, and to develop in them, with better salaries, the desire for a better style of living than that to which they have been accustomed. It would be proper and advantageous for these organizations to allot rewards and compensations to the good workman who has cultivated or planted more land during a certain period of time, to the laborer who more zealously attends to the education of his children, to the workman who has saved more during a certain period of time, to the laborer who has improved his dwelling with his own savings, to the laborer who has abandoned the bad customs and practices of his past life. Everything done toward lifting up the workingman's condition, toward furnishing him assistance and stimulus for his improvement, will result in benefit to our agriculture, as the work will be more intelligent, active, and exact, and with this the results of agricultural work will be far more satisfactory than at present.

It is a growing custom in developing a country's agriculture to organize fairs with rewards for the agriculturists who have demonstrated ability and merit deserving reward and compensation. This task is one of the most worthy for which the agriculturists' associations might be employed. Nothing will so much incite individual initiative, nothing will more exactly show the progress attained in the various cultivations, nothing will better persuade our agriculturists to improve their methods of planting and cultivation than this kind of exhibitions. The ambition for renown and fame has always constituted a powerful incitement to the human heart for the improvement and perfection of work. These shows should be periodical in order to obtain better results. It seems to me it would not be difficult to obtain economical coöperation from the Government for this kind of enterprise, if the shows were organized with seriousness and with probabilities of success.

It would be foolish for me to attempt to indicate more minutely

what these organizations should do in order to promote the development of agriculture in such an incipient stage as ours. I have indicated some general lines somewhat vaguely, firmly believing that you, with more competency, knowledge, and experience in the subject, can better than I explore the way in which you must direct your steps. I consider myself scarcely competent to predicate and advise you on subjects upon which I have little knowledge, but let me repeat to you for the last time that it is necessary for you to organize yourselves, because the improvement of agriculture means strength for the nation and security of the country's interests. There is no reason why we should not follow the example of other countries in which agriculture is rich and flourishing in spite of the lack of a soil so rich and fertile as that of the Philippines. Energy and virility, qualities which we suppose to exist in our race, can not have better demonstration than in the economical contest opened to the whole world's initiative and capital. In this fight we have to perish or save ourselves. We must fear little of what others can do against us while we live ready for the sacred defense of our own interests, working hard to obtain and keep them. Let us remedy our weakness and backwardness with a powerful demonstration of energy and courage in all the fields of our activity. We must not expect prosperity from any source other than ourselves, and we must organize ourselves for the purpose of achieving our common prosperity through the work that dignifies us and increases our welfare, with the confidence in ourselves without which everything would waver around us, our determinations would be vain, and our steps uncertain in the direction of a sure and definite future of prosperity and greatness. The Philippines are open to the struggle with capital and the interests of other countries found here, and since we can not avoid nor reject this condition it is necessary for us to face it with courage and resoluteness. We must bear in mind the following authoritative words of a great thoughtful man and consummate politician who was lately president of the United States—Theodore Roosevelt.

"Let us, then, boldly face the life of combat, resolved to fulfill our duty well and manfully, determined to be honest and brave, to devote ourselves to a high ideal and therefor to make use of practical methods. Above all let us not shrink from any moral or physical struggle inside or outside of the nation once we are sure the struggle is justified, for only by struggle, by bitter and dangerous endeavor, we hope at last to reach the end of our true national greatness."

NETHERLANDS INDIAN FIBER CONGRESS AND EXHIBITION AT SOURABAYA UNDER THE DIRECTION OF THE NETHERLANDS INDIAN AGRICULTURAL ASSOCIATION (JULY 3 TO 8, 1911.)

DETAILED PROGRAMME.

In our preliminary notice of February 25, 1909, it was announced that a fiber congress would be held at Sourabaya, Java, Netherlands India, in October, 1910, under the auspices of the Netherlands Indian Agricultural Association (Nederlansch-Indisch Landbouw Syndicaat), with the support and assistance of the department of agriculture of Netherlands India, and that in connection with this congress an exhibition of machinery, fiber plants, and the fibers prepared from the plants would be held. In view of the limited time for preparation it has now been definitely decided to hold the congress and exhibition on the 3d, 4th, 5th, 7th, and 8th of July, 1911.

The aims of the congress and exhibition are to further the cultivation of fiber plants in the Tropics, to advise planters regarding the culture of fiber plants, to discuss points on which there are now differences of opinion, to attain uniformity in methods of production and product, and to arrive at a proper insight as to the value of cultivating fiber plants both on a large and a small scale. For these reasons the congress will attach particular interest to those fibers which practice has shown to have met with some measure of success and which have consequently attracted the attention of planters and capitalists. Only short discussions will be devoted to anything relating to what is merely in an early experimental stage or has repeatedly led to disappointment.

The intention is to exclude the discussion of cotton culture from the congress, but not to exclude cotton from the exhibition. Sourabaya appears to be unfavorably situated for an effective discussion of points bearing on this culture, which has proved to be remunerative to the natives in only a few districts in Netherlands India. Ramie fiber will also be only lightly touched on, as experience with it has been universally discouraging. Coconut fiber will not be discussed.

PROGRAMME.

MONDAY, JULY 3, 1911, AT 6 P. M., IN THE THEATER AT SOURABAYA.

I. *Opening speech by the president of the Netherlands Indian Agricultural Association.*

II. *General review of the fiber industry.*

The congress will be opened in the evening of the first day by the president of the Netherlands Indian Agricultural Association.

In order to obtain an idea of the different questions relating to the cultivation and preparation of fibers, an introductory sketch will be given the same evening, in which the subject will be reviewed from botanical, technical, practical, and commercial points of view.

If possible, a short treatise on fibers will be published in order to leave as much as possible of the available time for discussion and argument.

TUESDAY, JULY 4, 1911, AT 8 A. M., IN ONE OF THE EXHIBITION BUILDINGS.

Cultivation and preparation of the Agave fibers.

The second day will be devoted to discussing the cultivation and preparation of the fibers, especially sisal hemp.

The intention is that various speeches will be made, each speaker taking a separate part in the matter under discussion. The botany of the Agaves, the suitability of various kinds for different districts, ground and climate, and especially particulars regarding the cultivation, such as plants, planting and attending to the plants, maintenance of the crop and catch crops, will all be discussed; after which the harvesting, the transportation of the leaves, the packing, the trade, and, finally, the prospects for this culture will be brought before the meeting.

If possible, a short demonstration illustrative of the methods of preparation will be given that day, entirely apart, however, from the tests of the machinery exhibits, which will be held on the fifth day.

There will be more discussion and debate than reading of papers, so that each speaker may relate his experience in order that all inquiries may be properly treated, and that each detail of the cultivation and preparation which is of importance may be thoroughly dealt with. The following points will be discussed: (1) Botany; (2) soil and climate; (3) plants; (4) planting; (5) maintenance of the crop; (6) catch crops; (7) harvesting and transport; (8) preparation (with demonstration); (9) by-products; (10) packing; (11) trade; (12) prospects, and estimated cost of production.

WEDNESDAY, JULY 5, 1911, 8 A. M., IN ONE OF THE EXHIBITION BUILDINGS.

Cultivation and preparation of Manila hemp.

The third day will be devoted to Manila hemp and Jute as well as substitutes for the latter. It is unnecessary to dilate here on the benefits to be derived from an exhaustive discussion of Manila hemp. *Musa textiles* is a plant eminently suitable as a native culture in tropical countries, nevertheless its extension on a large scale is impeded by the fact that its preparation is slow and consequently expensive, because no suitable machine is known for its preparation either on a small or a large scale. The discussion will so far as possible follow lines laid down for the discussion of Agave fibers and sisal hemp.

THURSDAY, JULY 6, 1911, AT 8 A. M., IN ONE OF THE EXHIBITION BUILDINGS.

On the fourth day the cultivation and preparation of kapok and pineapple fiber will be discussed.

I. *Cultivation and preparation of kapok* as follows: (1) Soil and climate; (2) plants, planting; as catch crop, maintenance; (3) harvesting, preparation, packing; (4) trade, prospects, estimated cost of production.

II. *Cultivation and preparation of pineapple.*

FRIDAY, JULY 7, 1911, AT 7 A. M., IN THE EXHIBITION BUILDING.

Testing and judging the machinery exhibits.

On the fifth day the trials of the exhibited machinery will take place. As soon as the necessary particulars are obtainable notice will be given as to which machines will be tested. The object of these trials is to give planters an opportunity of judging the merits of the machines which are necessary for fiber culture. An endeavor will be made to arrange the exhibits so that the different systems may be compared, thus enabling planters to arrange their preparing establishments in a practical manner.

SATURDAY, JULY 8, 1911, AT 8 A. M., IN THE LARGE HALL OF THE THEATER AT SOURABAYA.

Decisions arrived at with regard to the productiveness of the cultivation of fibers.

The sixth day will be devoted to the discussion of points relative to the productiveness of the cultivation of fiber, the presentation of diplomas, etc., as follows: (1) Sisal hemp; (2) Manila hemp; (3) fibers of the Jute species; (4) pineapple fibers; (5) kapok.

This meeting is especially intended for the collection and condensation of acquired data regarding the cultivation and preparation of fibers in concise form and the submitting of these data to the consideration of the fiber planters present. Information submitted to this meeting should, as far as possible, be concise on the following points:

- (1) By what means can productiveness of the cultivation of the various fibers be achieved?
- (2) With which cultures should experiments continue to be made?
- (3) Which of the afore-mentioned cultures are unremunerative and for what reasons?

6 P. M., IN THE LARGE HALL OF THE THEATER.

- (1) Report of the judging committee.
- (2) Prize giving.
- (3) Closing speech by the president of the Netherlands Indian Agricultural Association.

EXHIBITION.

GROUP I.—FIBERS AND FIBER-PRODUCING PLANTS.

Section A.—Collection of fibers, either growing or dried, which have hitherto not been prepared in Netherlands India for trading purposes.

Section B.—Fibers prepared for the European markets.

Section C.—Collections of plants, either growing or dried, from which fibers for the European market are prepared.

Remarks.—Exhibits in Section B should, as far as possible, be the usual trade samples, i. e., not fibers especially prepared for the exhibition, but the ordinary samples classified as is customary in the trade. The exhibiting of various assortments accompanied by quotations is strongly recommended.

GROUP II.—IMPLEMENTS FOR THE PREPARING OF FIBERS.

Section A.—Machinery for the preparation of Agave fibers: (1) Hand decorticators; (2) simple portable raspers; (3) stationary simple raspers; (4) stationary complex raspers; (5) decorticators of large capacity with automatic feed.

Section B.—Machinery for the preparation of Manila hemp: (1) Hand decorticators; (2) portable decorticators of greater capacity with driving power; (3) decorticators of large capacity with automatic feed.

Section C.—Machinery for the preparation of pineapple fiber.

Section D.—Hand machines for cleaning cotton.

Section E.—Machinery for separating the seeds from kapok.

Section F.—Machinery for the further manipulation of fibers, i. e., machines for preparing the fibers for the market.

Section G.—Drying apparatus for fibers.

Section H.—Packing machinery.

Section J.—Machinery for the manufacture of the by-products of fibers.

Section K.—Engines not forming a part of a decorticator.

Diplomas will be awarded for each section.

THE NETHERLANDS INDIAN AGRICULTURAL ASSOCIATION.

A. PAETS TOT GANSOIJEN, *President.*

D. J. R. PUTMAN CRAMER, *Secretary.*

COMMITTEE IN CHARGE OF THE CONGRESS AND EXHIBITION.

Honorary President.—The director of the department of agriculture in Netherlands India, Buitenzorg.

President.—T. Ottolander, vice-president of the Netherlands Indian Agricultural Association, Taman Sarie, Banjowangi.

Secretary.—W. Birnie, solicitor, Sourabaya.

Treasurer.—D. J. R. Putman Cramer, secretary of the Netherlands Indian Agricultural Association, Sourabaya.

Members.—J. J. Benjamin, head agent of the Colonial Bank, Sourabaya; K. Heyne, chief conservator of the department of agriculture, Buitenzorg; G. J. Hupkes, director of the Netherlands Indian "Industry," Sourabaya; E. De Kruyff, chief bacteriologist of the department of agriculture, Buitenzorg; G. G. Schrieke, manager of Banjoe-lor estate, Banjowangi.

Representative in Europe.—Dr. G. Van Iterson, of the Technical High School, Delft, Holland.

TOBACCO GROWING IN THE PHILIPPINES.¹

By JOHN S. HORD.

I shall take two liberties with this subject. First, I shall make my address a short one, because any attempt whatever to go into the details of this matter would take up entirely too much of your time and reduce the opportunity for the general discussion which, I understand, is to follow my remarks. In the second place, I shall consider the matter of the proper curing and preparing the tobacco leaf for market, because a certain quantity, possibly a sufficient quantity, of good leaf is already being grown in these Islands, and the real problem to be solved, as I see it, is how to prevent the almost criminal methods whereby the good leaf after being cut and removed from the field is, with the rarest of exceptions, utterly ruined for commercial and industrial uses by the process of alleged curing, fermenting, and grading to which it is now subjected in the tobacco-growing sections.

Outside of the Cagayan Valley really good tobacco has, so far, only been grown in spots and places, and in such small quantities as to be fairly negligible. There are four or five plantations in the Cagayan Valley where good and properly cured tobacco is produced. About 90 per cent of the tobacco from that valley is raised by some 20,000 small planters averaging a little over an acre apiece. They plant from 10,000 to 12,000 plants to the hectare, or say 5,000 to the acre. This is not as many as one man can plant and pick, but it is as many as one man can properly care for after the picking, because 10,000 plants will yield anywhere from 160,000 to 200,000 leaves. If they properly cared for that number it would be all right, but they do not, and that is why the tobacco crop from that valley is nearly all wrong. Very few of these small planters have drying sheds; they expose the cut leaves to the direct rays of

¹Paper read before the Agricultural Conferences at the Philippine Carnival, February 8, 1910.

the sun, which saps them of all aroma and toasts them so as to make of little avail the subsequent fermenting and pressing. Yet when I was in the valley a couple of weeks ago I found no one talking of putting up drying sheds nor of better methods of fermenting and preparing the leaf for market. But I did find them all talking of the bumper crop that they were going to raise this season and how they were going to put in double the area of land they had planted last year. The price of leaf tobacco went up amazingly last season, and those well-meaning but densely ignorant people are under the impression that the price of tobacco can perpetually go up at the same time that the quality of the leaf perpetually comes down. It is the duty of the Government, especially of the Bureau of Agriculture, to at once point out to them the fallacy of their reasoning and to demonstrate to them that a small crop of properly prepared tobacco has a much greater money value than a much larger quantity of weeds which can be called "tobacco" only through courtesy. If this is not done, and done quickly, in about another year the people of the Cagayan Valley will be cursing the Payne Bill instead of blessing it as they are doing at present.

Besides the really good, properly cured tobacco produced on a few of the larger plantations a certain small proportion of the tobacco raised by the 20,000 small planters is also found to be good and is mixed up with a immense mass of rubbish. Much of this comes to the Manila manufactories with the varying qualities of leaf all mixed up in the same bale. Anyone can convince himself of the truth of this statement by visiting one of the local manufactories and witnessing the constant occupation therein of sorting over anywhere from five to twenty bales of leaf labeled "first class" in order to get a quantity equal to one bale really of that quality. One of the largest purchasers of leaf in the valley systematically sorts all of the leaf purchased, retaining all of the good leaf found for use locally in the manufacture of cigars for domestic consumption and for export as cigars, and the remainder is exported in its leaf form to supply the government monopolies of Europe, which require tobacco not too high in price and therefore not too good in quality. And it is this phase of the matter which, I believe, presents the only real difficulty in the solving of the problem of how to improve the quality of the Philippine tobacco leaf. Due to the late increase in the price of tobacco in these Islands, the Government of Austria has already decided to suspend further purchases here.

Leaf tobacco is usually considered the raw material in the manufacture of cigars. Strictly speaking this is not true, properly cured leaf being really a semi-manufactured article. Just as in all industries the consumers decide how much they want of each grade of the product, so in the case of leaf tobacco the present and past trade with Europe, Asia, and Australia must be preserved and the new market in the United States must be added thereto if the maximum of the benefits anticipated from the passage of the Payne Bill are to be realized. In the past the government monopolies have used about 60 per cent of the 40,000,000 pounds of tobacco leaf raised in these Islands, and they must continue to be supplied with the quality of leaf they are willing to pay for. If their very reasonable request in this particular is not complied with, they will all go elsewhere for their tobacco. Spain imports more leaf tobacco to-day from the United States than she does from the Philippine Islands. This change has taken place within the last three or four years. But while preserving all of these old markets, enough first-class leaf should be produced—say, 15 or 20 per cent of the total crop—from which can be made the 150,000,000 cigars now allowed free entry into the United States. That trade can only become permanent through a radical change in the existing methods of curing and preparing that quantity of leaf. It is a problem well worth solving, and it must be solved because it can be solved. In all countries, to a greater or less degree, national prosperity rests, in final analysis, on agriculture. This is peculiarly true of the Philippine Islands. The agricultural base here is particularly broad and all embracing. From any and every point of view, and from all combined, the work to be done in future by the Bureau of Agriculture in these Islands can be considered by far the most important and responsible that has confronted the Insular Government in the past or which can confront it in the future. I believe that that duty will be well and thoroughly performed. It would, I believe, be a most grievous blunder of far-reaching effects to allow, at this crisis, an exaggerated notion of the evils of paternalism to obtain and to control governmental action. A generation ago the indigo industry of these Islands was ruined by tactics similar to those now being followed in the tobacco industry. Even now the hemp industry is far advanced along the gloomy road already travelled by the indigo industry. Of what avail to the people of these Islands will the free entry of our cigars into the United States market prove if the tobacco industry, the base on which the

cigar industry necessarily rests, is allowed to decay? Because of their ignorance or indolence, or of both combined, are the people of the Cagayan Valley to be allowed to inflict an irreparable injury directly on themselves and indirectly on everyone else in these Islands?

Nature has done wonders here in the way of a soil and climate, unsurpassed elsewhere, admirably adapted for the production of the very best tobacco leaf. Nature now grows good leaf, but man, begrudging his small share of effort, spoils it before it gets into the channels of trade. Spain had here in successful operation for one hundred years a system under which good tobacco leaf was produced. She abandoned that system several years before the time of the American occupation, not because of its inadequacy, nor because of any structural defect in the system itself, but simply because of the abuses which developed in its administrative enforcement and of the occasional cases of "graft" which were discovered in the classification of the leaf after it had been properly grown, cured, and prepared for market. The system in operation then was about as follows:

The seed beds were located on well-drained hillsides, were planted at the proper time, were cared for by the old men, the women, and the children, and selected seedlings were transferred to the fields and properly cared for while growing. Each planter, however small his holding, had a small drying shed of his own, inexpensively constructed of cane and cogon grass, where each leaf was properly cured and given the first fermentation before it was allowed to leave the premises where grown. Very inferior leaf was destroyed by burning. All of this work was done under governmental supervision, as was the grading of the leaf before it entered the channels of trade.

Compare that satisfactory condition with the deplorable one which obtains at present and which I shall briefly outline:

The traveling merchant and other purchasers in the Cagayan Valley, about the time that the seedlings are transferred to the fields, begin to advance money and goods on credit to the planters with crop liens as security. About the time the leaf is picked, or very soon thereafter, they demand payment of the debt by delivery of the leaf, whatever its condition, and they receive it "en partida," that is to say, unclassified. The planter wants further credit and delivers the leaf as soon as he can dry it a few days in the sun, the hotter the better, and has put it through the most perfunctory process of fermentation. It is no longer his property, and there is therefore no object for

him to put his leaf in proper condition, because to him, at least, such additional work will not enhance its value.

If this condition is tolerated for even one year more, can any sane man doubt, can the most buoyant of optimists deny, that the Philippine Islands will lose their tobacco market in Europe because of the high price and in America because of the low quality of the leaf?

AN INVESTIGATION OF THE LOCUST PEST IN THE PHILIPPINES.

By DAVID B. MACKIE, *Agricultural Inspector.*

The agricultural interests of the Philippines have suffered more or less for many years past from the inroads of locusts. The damage done is not confined to any particular island or group of islands, but during the past season reports were received most persistently from Negros and the provinces of central Luzon, although locusts were known to be present in Cebu, Leyte, Panay, and other islands. The southern provinces of Luzon seem to have suffered the least. As this past season was one of great drought, conditions were very favorable for the development of the pest, and it is safe to say that next year, unless preventive measures are adopted, the damage will exceed that of this year.

The locust feeds on most of the higher orders of plant life, but seems to prefer the cereal crops, and it is chiefly through damage to them that our agricultural interests suffer. Several genera, containing quite a number of species, are represented among the locusts in this Archipelago, but the species responsible for the greatest amount of damage belong to the genus *Acridium*. Such species are gregarious in their habits and from their earliest infancy assemble in immense swarms, traveling from place to place as they exhaust the food supply. It is a noticeable fact that they travel very little during rainy or cloudy weather. After they have matured and developed wings they spend most of the day assembled in vast swarms, generally in the open. When in motion, the swarm seems to follow no particular direction, but drifts along the lines of least resistance, which are generally open fields or roadways. They leave shortly after sunrise in the morning and about 4 o'clock p. m. seek the nearest high grass or standing vegetation, which they ascend and settle upon to pass the night. The

flying locusts generally prefer isolated clumps of bamboo or some other growth adjoining open land, and they frequently alight in such vast numbers as to completely obscure the trees, often causing them to break under their combined weight. They are strong fliers and often travel considerable distances when assisted by the wind; thus it is that districts which for years have not been visited by the pests may be suddenly overrun with them, while other localities which before have been badly infested may be entirely free from them.

LIFE HISTORY.

Only a few facts pertaining to this subject can be given, as the writer has made no attempt to work out the life history in detail. Young locusts, although exceedingly small when hatched, are very active and commence feeding within a few hours after leaving the eggs. The larvæ are not strong jumpers, however, until they are half-grown. They travel comparatively long distances, when it is considered that they proceed by walking and not by jumping. On the tracks of the Manila Railroad a swarm of locusts has been observed that traveled over 2 miles in one day. During the period of molting the insect ceases feeding and climbs upon a stalk of grass; after a short time the old skin splits along the back and the insect crawls out. For a little while it is very soft and unable to move, but in a few hours regains its activity. The insect changes upon completion of the different molts, the last molt being marked by the full growth of the wings, at which time the locust is ready to fly. Upon completion of the last molt, the mature insect, after spending a few days flying about with the swarm awaiting proper weather conditions, begins mating. Shortly after mating oviposition commences. The female arches the body and by the aid of two abdominal appendages known as palps, which she moves in a lateral direction, digs a small hole about an inch and a half in depth, generally curved forward. Often more than one hole is started, as the texture of the soil may be such as to prevent the insect's reaching the required depth, or a stone may interfere with the work. In this hole the eggs are deposited and covered with a frothy, viscid secretion, which later hardens and cements them into a solid mass which is impervious to the action of water. The period of incubation is ordinarily about six weeks, but may vary slightly according to the temperature to which the eggs are exposed.

NATURAL ENEMIES.

Under natural enemies may be included those influences which are not controlled by the agency of man, among which may be mentioned insectivorous birds and mammals, parasitic and predacious insects, weather conditions, and natural tendencies which make for their own destruction.

Insectivorous birds and mammals.—In the larval stage the insect is persistently preyed upon by many different birds, especially crows, small hawks, and gallinaceous birds. When the swarms are in the vicinity of dwellings domestic fowls, especially turkeys, are instrumental in killing numbers of them. The fliers do not suffer so extensively from the attacks of birds, as they spend most of the day in flight, yet they are eaten to some extent by cuckoos, which catch them while on the wing. During the hopper stage the domestic dog eats more of them than any other mammal, and in badly infested territory dogs may be seen with their abdomens greatly distended, due to their stomachs being gorged with insects. The contents of the stomach of one dog which was accidentally poisoned was examined and over 1,500 locusts were counted. Other mammals, such as rats, shrews, insectivorous bats, and lizards, feed on the insects to a certain extent, but the number thus destroyed is so small as to be of no economic importance.

Insect enemies.—This matter has not been given much attention, but it is known that locusts are one of the intermediate hosts of certain species of hair worms and mites. Large hoppers of an inch or more in length are often attacked and killed by certain predacious bugs (*Hemiptera*) which resemble the wheel bug of the United States. Whether the larvae are preyed upon by any hymenopterous parasites has not been observed, but as they are parasited in India and Australia by both hymenopterous (*Ichneumon* flies) and dipterous parasites (*Tachina* flies), also by flies that parasitize the eggs, it is probable that such parasitism occurs in these Islands.

Fungi.—As certain fungi are known to be parasitic upon locusts some experiments were tried with different fungi to test their adaptability, but owing to atmospheric conditions they were not found feasible.

Climate.—Weather conditions form no important factor in connection with the increase or decrease of locusts. The young larvae will stand a great amount of rain, and unless the district is flooded there will be no noticeable decrease. Droughts, unless

of sufficient length to destroy vegetation, produce no perceptible decrease. Typhoons are sometimes instrumental in destroying swarms of flying locusts by blowing them out over the ocean, but such are rare occurrences.

Cannibalism.—The tendency of the locust to this habit first came to our notice at the Alabang stock farm, and it is believed that in the use of accumulative arsenical poisons, such as arsenical sprays, this habit may later be made of some economic importance in dealing with the pest. In the instances of cannibalism observed no particular mode of attack was discovered; it is simply the process of one eating the other. Death does not generally result until the entire abdominal and part of the thoracic section is eaten. The weaker individual is attacked by a stronger member, or sometimes by two or three; the legs are often bitten off and eaten first, at other times the abdominal section is eaten first. The head is the only part not eaten, and this probably on account of the heavy mandibles.

METHODS OF DESTRUCTION.

Under this heading may be mentioned driving, killing with insecticides, either stomach poisons or contact sprays, and the use of a burning torch.

Driving.—This is the most popular and virtually the only native method of destroying locusts. It is practiced when the weather is dry and the locusts are traveling in large numbers in search of fresh food supplies. It is a simple method and when carried out properly is very effective. It is also economical, but is strictly a method of the open country and can not be successfully employed on land that has a standing growth of grass, such as cogon (*Imperata cylindrica*), which is the prevailing grass of the uplands.

First, the direction in which the swarm is traveling is noted, and at a suitable place a trench of variable dimensions, usually about 1 meter deep, 1 meter wide, and 3 meters long, is dug. Upon completion of the trench a fence about 5 meters long and 1 meter high should be built and placed in the shape of the letter V, with the large opening toward the swarm and the small one emptying into the trench. This structure may be composed of tin, boards, or any smooth material that insects are unable to climb. The corrugated sheet iron used for roofing is very good material and is generally obtainable in most of the municipalities. If none of the above-mentioned materials are available, earthen dykes faced with banana stalks may be used with success. When everything is ready a gang of say six to eight men with flags or

branches surround the swarm and drive it into the trench. Care must be taken not to drive too fast, because if approached too closely the locusts will become confused and attempt to escape in all directions. With proper care, however, they can easily be guided in any direction. After they have been driven into the trench they may be killed with boards or branches. If the trench has water in it, a small amount of kerosene poured on the water will do the work very effectively.

Use of insecticides.—Insecticides may be separated into two classes, those that act upon the digestive organs and those that kill by contact. The contact insecticides may be again divided into those that act on the respiratory system and those that are absorbed through the skin, both of which may be used successfully to combat the locusts. With insects like the locusts, which are preëminently leaf-feeders throughout their entire life and consume such a large amount of food per capita, a stomach poison naturally appeals to us as the most reliable. This may be applied either by means of spraying a soluble poison on foliage which the locusts will eat or by mixing it with some prepared bait which is spread in their path for consumption.

STOMACH POISONS.

Arsenate of soda.—A mixture of arsenate of soda and water at the rate of 1 kilo of the arsenate to 64 liters of water, with enough molasses to sweeten the mixture, was applied with a knapsack spray over an area of approximately 200 square meters of standing cogon grass, in the shape of a crescent, at the Government farm at Alabang, Rizal, on September 10, 1909, in front of a swarm of about three-quarter grown locusts. Conditions were favorable and the spray was applied to the grass at about 4.30 p. m., as at that time the insects were ascending the grass to feed and spend the night. The following day an examination of the sprayed area showed great numbers of dead insects and also numerous odd heads, proving conclusively that the stronger insects feed upon the weaker. On one square meter 2,060 dead locusts were counted. The foliage was badly burned by the arsenate applied at this strength.

The following day a mixture of one-half kilo of arsenate of soda to 48 liters of water, sweetened with molasses, to which had been added a small amount of zinc oxide to whiten it so there would be no danger of spraying the same place twice, was tried on a swarm of almost full-grown locusts. The swarm was in a small dry water course that was overgrown with

young rain trees, bushes, wild grass, and weeds. The insects were numerous and at the time of spraying were feeding; the noise they made cutting the foliage could be heard at a distance of over 15 meters. Weather conditions were favorable and the poison was sprayed on at about the same time, 4.30 p. m., as at that time there was little risk of the swarm's moving. About 250 square meters were sprayed. The next morning many dead insects were found lying beneath the bushes, but the foliage showed decided evidence of being burned. The leaves were all spotted and contained large dead patches. A subsequent examination made the same afternoon showed that the foliage of the entire poisoned area had turned brown, owing to the fact that the arsenate of soda had burned the leaves.

Experiments with the commercial article were then discontinued and later a home-made article was used, consisting of white arsenic, 2 kilos, and sodium carbonide, 1 kilo, added to 12 liters of water. To every 32 liters of water 1 liter of the stock solution was used with enough molasses to sweeten it. This was sprayed on standing grass and shrubbery which was infested with a swarm of almost full-grown locusts. Weather conditions were favorable, but the swarm was disturbed to a considerable extent, and, although many dead insects were found next morning, not as many were killed as should have been. The foliage was damaged to a considerable extent. This was the last of the experiments in which an arsenical solution was sprayed on standing growth.

From the experiments described above, it has been found that it is not advisable to use the arsenate of soda solution as a spray upon standing growth, unless this growth is of no value, as the arsenate is absorbed into the leaves through the stomata, thereby killing the plant tissues. Then, as the plant withers and dies, the insects do not feed upon it, so, unless it is eaten soon after it is sprayed, it is of no use as a killing agent. One advantage, however, is that as the sprayed foliage turns brown and dies the danger of stock feeding on it is partially eliminated. The price of arsenate of soda in Manila is ₱3 per kilo, which makes its use almost prohibitive.

Arsenate of lead.—In these experiments a home-made article was used, prepared from the following formula: 341 grams of sugar of lead dissolved in 4 liters of hot water. To this was added 124 grams of arsenate of soda previously dissolved in 4 liters of hot water, and by the combination of the two solutions a milky mixture was obtained. The lead arsenate separates slowly and may be recovered in the form of a thick

precipitate; 120 liters of spray were prepared from the above-mentioned ingredients and the results were very gratifying. In the case just mentioned the area was sprayed late in the afternoon, in the customary crescent shape, about 250 square meters being covered. The weather conditions were not the most favorable, as the sun was not shining and there was a thunderstorm gathering. This storm broke about 6 p. m. and undoubtedly washed off a large portion of the poison, but a sufficient number of dead locusts were found to demonstrate the efficiency of the poison. In fact, as this mixture has been used by the writer by the ton, sprayed at various degrees of strength, under all conditions of weather, and from machinery of every description ranging from the simple method where it is applied by being shaken from a broom which is dipped in a bucket of the mixture to the large steam and carbonic acid gas sprayer with a capacity of 12,000 liters a day and capable of being used on a stand of forest trees, there can be no doubt whatever regarding its efficiency. Arsenate of lead has some decided advantages over most other arsenical compounds in that it may be used at any strength and not injure the foliage, it is practically insoluble, and its adhesive qualities are great, one spraying being sufficient to last the entire season. The land sprayed by it, also, is easily recognized by a whitish color, thus averting danger to stock from feeding upon the foliage. Where careless application might cause injury these are all important factors. This insecticide is rapidly springing into favor with agriculturists, on account of the above-mentioned qualities, and is largely replacing Paris green. There are many commercial brands on the market which must be used in varying strength as the amount of arsenious oxide contained is not the same in any two, varying from 10 to 20 per cent, and consequently a different amount of water is required to obtain the correct consistence. Of the different brands now upon the market, that put out by the Vreeland Chemical Company (Electro brand) shows the highest percentage of arsenious oxide and relatively the least amount of arsenic in solution and is also one of the lowest priced of the commercial articles. This is probably due to its being made by an entirely new method. It can be bought in 45½ kilo buckets at 25 cents gold. When used at the rate of 14 kilos to 400 liters of water it makes a very attractive insecticide for all of the smaller leaf-feeders and could be strengthened for the larger ones. Its cost is about the same as that of Paris green.

Arsenate of soda.—As a poison for bait this is very effective,

but great care should be taken when using it to see that none is left lying around where stock can eat it, as they readily will if given the opportunity. In an experiment tried at Calamba, La Laguna Province, September 21, 1909, conditions were somewhat unusual, as the experiment was made on a large swarm of half-grown locusts that were traveling along the railroad track. Weather conditions were perfect and the time of the experiment was 10 a. m. A mixture of arsenate of soda made at the rate of about one-half kilo to 40 liters of water with enough cheap molasses to make the solution sweet and sticky was prepared, and cogon grass which had been exposed to the sun for fifteen minutes to slightly wilt it was soaked in the solution. This grass was then distributed thickly over the ground and was readily eaten by the locusts, being devoured in about fifteen minutes. One feature of the experiment which tended to lessen its value was the fact that the swarm was so immense, that, as the major part of it was on the track between the rails, traveling forward rapidly, the new arrivals literally pushed the ones that were feeding ahead and were in turn forced ahead themselves, thus being unable to eat their fill. The movements of this swarm were watched for over three hours, and great numbers of the insects showed evidence of poisoning by their lack of energy and also by their loss of the sense of direction, traveling in small circles of 2 or 3 inches in diameter instead of straight ahead. Cannibalism appeared here also, in that as soon as an individual showed evidence of weakening he was immediately attacked and eaten by the others.

Another experiment was tried with arsenate of soda, in which the same proportion of ingredients was used, but the method of preparation was slightly different. The water was boiled in one of the large iron dishes, such as are used to boil cane juice, and to this was added the arsenate, which was stirred until thoroughly dissolved, after which the molasses was added. It was noticed that by boiling the consistency of the mixture was improved and made more uniform. The cane was first kneaded about in the poison until it became thoroughly saturated, which process took about ten minutes, then removed to a large basket and a second lot added, and so on until all the poison was used. The exact amount of cane necessary to absorb the 40 liters of poison was not noted in this experiment, but when spread out in the path of a traveling swarm of nearly mature locusts, it covered an area which exceeded 100 square meters. The locusts ate this cane eagerly and did not stop until they had devoured everything but the tough outer husk. Better results were obtained in this

experiment and were the more manifest as the area was larger and the entire advance of the swarm was checked. This experiment was, however, greatly interfered with by inquisitive natives who persisted in wandering in amongst the poisoned baits and disturbing the feeding locusts. Arsenic, carbonate of soda, and molasses were tried, with practically the same results as in the previous experiment.

CONTACT INSECTICIDES.

Pure kerosene.—As the price of this article renders it prohibitive if used in a pure form, it was experimented with once only, at the stock farm at Alabang, Rizal, where the locusts were causing considerable damage. Pure kerosene was poured on some puddles of water which were in the path of a moving swarm of locusts. Upon arrival of the swarm at the water many jumped boldly in, but few reached the other side, although the distance was but slightly over 1 meter. Soon, however, the entire surface of the pools became covered with dead locusts and the remaining ones were able to walk over on them.

In another experiment the pure oil was sprayed upon nearly full-grown locusts, which were killed almost immediately upon coming in contact with the oil.

It was also tried on a swarm of mature insects as they settled on a clump of bamboo for the night. The insects were sprayed heavily and fell to the ground in immense numbers, but some were able to fly off again. On the following morning examination showed many dead insects and some that were yet alive, although unable to fly. As this clump of bamboo was surrounded by a growth of talahib (*Saccharum spontaneum*) which was over a meter and half high any careful search for the dead insects was impossible. The kerosene was tried on this swarm because conditions were unfavorable for the application of internal poison and their appearance demanded immediate attention.

Crude petroleum.—This was sprayed upon a swarm of nearly mature locusts, resulting in almost immediate death. Although this might be an expensive spray for use on an extended area, yet as the insects travel in very compact bodies and as only the small territory actually covered by the moving locusts would be sprayed, comparatively none of the oil is wasted when any care is taken in applying it. It can be bought at the rate of 18 centavos per imperial gallon, landed in Manila.

Crude petroleum used as a burning torch.—Crude petroleum has a decided advantage over other contact sprays in that during rainy weather the spray pole can be converted into a powerful

burning torch. If the nozzle is mounted on a $2\frac{1}{2}$ -meter pole, a flame of about $1\frac{1}{2}$ meters long can be obtained, and as this flame rests about one third of a meter from the nozzle there is no danger of melting the parts. An experiment of this nature was carried on in Laguna Province. Rain was falling heavily and the locusts were in high cogon, but in spite of the rain the grass was ignited and the whole swarm destroyed. The only drawback to this method is the intense heat to which the operator is subjected. This burning method is doubly effective, in that it kills the pests and clears up the grass at the same time. A new growth shortly springs up that affords better pasture for stock.

EXPERIMENTS ON CAGED SPECIMENS.

This is practically a complete list of the field experiments tried thus far, though a few have been tried on caged specimens. These latter experiments were conducted to determine the length of time required before the effects of the poison are manifested, and also the extent to which it could be communicated through the locusts themselves. In one instance fifteen three-quarter grown locusts were fed on cogon grass which had been soaked in a solution of 1 to 10 of the commercial arsenate of soda. The food was put into the cage at 10.30 a. m. and the insects commenced feeding immediately. At 2 p. m. they began to show symptoms of poisoning and by 4.30 they were all dead. The remaining food was then removed and fifteen more locusts were put in, but they did not seem to care particularly for their dead brethren and only three were partially eaten.

The same experiment was repeated next day, and this time the second lot was put into the cage soon after the first lot began to show signs of poisoning. Lot No. 2 soon began to feed on Lot No. 1 and before two hours had eaten nine of their comrades. The following morning only three insects were alive in the cage. As there had been but six left of Lot No. 1 it is safe to conclude that the three remaining alive were not of that lot. The three living ones were put into a cage with five healthy specimens, which ate them. As no deaths occurred among Lot No. 3 we must draw the conclusion that the three living ones of Lot No. 2 had not eaten sufficient poison to affect the ones eating them, or that the strength of the poison had worked itself out.

The results of these experiments prove that by this method advantage may be taken of the cannibalistic tendencies of the insect and that if poison is made of an accumulative nature and

used on a large scale this tendency of the insects could be so directed as to bring about their own destruction.

OTHER METHODS.

A new method, a trial of which proved that it is worthy of further recognition, was the use of a windrow of hay soaked with crude petroleum to act as a repellent to keep the hoppers out of planted crops. In this experiment a heavy crude oil supplied by the Bulldog Oil Company, of California, was used. The results were very satisfactory and the hoppers kept away from it, not even attempting to cross it. The only attention the hay needs is to be shaken up about once a week and wet down with oil every second week. Such barriers can be laid along roadsides and whole sections may thus be kept free from the insects.

The method in use against the rice bug in British Guiana, which consists of a bag stretched on a frame and rapidly drawn over standing crops, suggested that the idea might be modified and used to advantage against the locusts, and on reading some of the reports of the Agricultural Research Institute, of Pusa, India, it was found that this method has been perfected and is one of the most popular methods of dealing with the locust pest in that country.

The following is taken from a pamphlet sent through the kindness of H. Maxwell-Lefroy, esq., entomologist to the government of India, who states that this is the common method employed against the pest in India:

Sufficient strips of cloth are taken, each 14 feet long, sewn together by their long edges to make a piece 14 feet by 6 feet. The two ends are then brought together and the sides sewn up. This makes a flat bag, to which strong cloth tags are sewn, the first at one seam, the next 2 feet from that, the third 4 feet from the second, the fourth 2 feet from the third and 4 feet from the first. Bamboos of 2 feet length are fixed between the two pairs of tags 2 feet apart and the bag is ready.

The frame is made of four pieces of bamboo, each 4 feet 3 inches long, laid in a square, the ends of two bamboos on the ends of the other two. Two crosspieces of split bamboo, each 5 feet 8 inches long, are laid diagonally across the square. Two pieces of bamboo, each 2 feet 3 inches long, are placed upright at the corners of one side, and two split bamboos, each 4 feet 8 inches long, are placed from the top of these uprights to the nearest corner. A crossbar, 4 feet 3 inches long, is then placed to unite the top of the two uprights. As the bamboos are placed in position they are bound with string or fiber in the order given above. Enough bamboo should project at the ends to allow of their being bound together. This makes a frame, to the front of which the bag above is attached by the tags.

In these figures, 3 inches extra length is allowed to permit of the
94779—3.

bamboo being bound; the resultant frame is then of the size to accommodate the bag. The 2-foot long bamboos used for keeping the bag open are inserted only when the bag is used alone; when the bag is attached to the frame, these bamboos are removed and the tags of cloth knotted to the frame, so that the bag can be at once removed and twisted up. In place of bamboo, strips of wood may be used.

The dimensions given are those found handy for one or two men's work. Large bags for open lands may have an opening 12 feet wide, 2 feet high, and a depth of 8 feet. In this case the bag should be weighted with pockets of sand sewn into the lower edge of the mouth and the corners of the back. Two men can manipulate such a bag and cover a large area of land.

WELL-KNOWN INSECTICIDES.

Before leaving the subject of these various methods of destruction, a list is given of different poisons which, although they have not been experimented with in the Philippines, are well-known insecticides. Their efficiency has been thoroughly demonstrated, and some facts concerning them may, therefore, be useful to our readers.

Arsenate of lime.—This is one of the most powerful arsenates and one of the most powerful of the homemade articles. One of the easiest ways to prepare the homemade article is to take 1 kilo of white arsenic and one-half kilo of carbonate of soda. These should be mixed dry and later enough water added to reduce them to the consistency of a paste. To this add 4 liters of water and bring the mixture to a boil, letting it boil about five minutes. There should be no sediment. This can be bottled for future use and when needed slaked with about 1 kilo of lime and 8 liters of water to 1 liter of the arsenical mixture. Mixed with 120 liters of water this should be strong enough to kill grasshoppers in any stage of development.

Paris green.—This is one of the oldest insecticides on the market. It does not remain in suspension well and needs frequent agitation to insure the best results. Cheap commercial mixtures are liable to contain a certain amount of the arsenic in solution. Its adhesive qualities are not great, either, as the spray is mostly washed off by the first shower. The commercial article sells at about 32 centavos per kilo and at this price makes a cheap spray. With proper care there is no reason why excellent results should not be obtained and any failure may be attributed to carelessness on the part of the user. The commercial article is often diluted with sand, white arsenic, etc., but the standard articles are rarely subject to adulteration. A spray made up of Paris green, one-half kilo, water 500 liters, and lime freshly slaked one-half kilo should be effective on locusts at any stage.

Schules green.—This resembles Paris green. It remains in suspension better, contains a higher percentage of arsenic, and is cheaper. However, it is not extensively used.

London purple.—This resembles the preceding. Although it contains a somewhat higher percentage of arsenic, it is liable to contain also more arsenic in solution, due to its being a by-product, and therefore unreliable, as of varying composition. A spray composed of London purple one-half kilo, quick lime 2 kilos, and water 500 liters used the same as Paris green is very effective.

Sanitary fluid.—This is one of the crude carbolic-acid preparations and has been highly recommended by the Indian government. It is possible to secure it in commercial quantities at a cost of 2 rupees (about ₱1.28) per 20 liters, and this used at the rate of one can to 150 gallons of water should, provided it is effective, make a very inexpensive spray.

Arsenate of iron.—This is a new insecticide which is not yet on the market in commercial quantities. It has, however, been tried and has been found effective without damaging the foliage. It is said to be the by-product of certain ores, after crushing. It is used in the proportion of 2 kilos of arsenate of iron to 400 liters of water.

SPRAYING APPARATUS.

Apparatus for using insecticides in the Philippine Islands must be inexpensive, simple in construction, and light and easy to transport. The following is a list of the apparatus used in a series of experiments, which gave very satisfactory results when tried under the different existing conditions, such as for distributing poison sprays and for use as a burning torch.

A set consists of one Gould bucket pump (the common disinfecting pump), with a length of hose $7\frac{1}{2}$ meters long, to which is attached a $2\frac{1}{2}$ -meter length of quarter-inch iron pipe, on which is mounted a spray nozzle (the couplings and nozzle are supplied with the pump); two cans holding about 20 liters (in experiments empty kerosene cans were used), one for use with the pump and the other in which to mix the spray; and two iron buckets for carrying water and for emergency purposes. The above-mentioned articles may be purchased in Manila for the following prices:

Pump and connection	₱6.87
Hose per $\frac{1}{2}$ kilo .....	.30
Pipe (iron) per $\frac{1}{2}$ kilo .....	.05
One Stilson wrench	1.50
Total	8.72

The advantages of this kit are its comparatively low cost, its simplicity, its weight, its durability, and its adaptability to the different methods. To the casual observer it might seem that these pumps would be insufficient in capacity for the economic distribution of the insecticides, but as the swarms are compact and are easily surrounded when found, the infected area may be sprayed and the pumps moved quickly across a ravine or over other equally difficult ground where, on account of the absence of good roads, it would require considerable time and expense to move a power pump.

Method of applying spray.—When the insects begin to manifest a desire to stop and feed, which they do between 3.30 and 5 p. m., the place where they will spend the night can easily be located, and by having a party on the outlook the movements of the different swarms may be followed and the apparatus made ready at the location selected.

The greatest care must be exercised in applying the sprays, for by carelessness in its application the spray will be wasted by being unevenly distributed and some places left untouched by the poison, thus allowing a number of the insects to escape unharmed.

Experience seems to show that by starting two sets of men at a point ahead of the swarm and working laterally in the form of a V which will be large enough to reach the edges of the swarm, the insects can be forced toward the center, into a smaller area and more compact form. Under ordinary conditions, where the locusts are feeding on cogon or other grass, the work should be completed in about fifteen or twenty minutes. Not over 60 liters of spray will be required to spray an area in front of an ordinary swarm. By a careful check on work done it has been found that 1,056 liters will cover 1 hectare of grass land. Allowing for the necessary stops for filling, etc., one-half hectare could be covered by one pump in eight hours. The total cost of spraying 1 hectare is about ₱9, including cost of materials and labor for spraying.

THE CULTIVATION OF THEOBROMA CACAO OR COCOA.¹

(Continued.)

By A. FAUCHÉRE,

Assistant Inspector of Agriculture in Madagascar.

PRUNING.

All authors who have written upon the cacao agree as to the importance of pruning. But no one, I believe, has attempted to impose definite rules that must be implicitly followed.

According to nearly all authors pruning of the cacao consists of little more than careful lopping at regular intervals of the dead wood and the branches that extend too far.

The planters of the different cacao-producing countries do not agree as to the utility of pruning. In Trinidad and Surinam they prune everywhere with more or less care. In Venezuela they content themselves with taking out the suckers. In Ecuador the cacaos grow as they will; they are never pruned and the suckers are never taken out; but here as elsewhere the trees live long and produce well. Trinidad and Surinam planters hold that pruning is quite indispensable, while in Ecuador it is considered unnecessary. These differences of opinion among men who succeed equally in cacao culture may be explained, I think, by the different environments in which they operate. In lands of great fertility like those of Ecuador the cacao is able to produce abundantly and live long in spite of the lack of pruning. But in soils that are not so rich, like those of Trinidad and Surinam, it is an established fact that judicious pruning increases the production and prolongs the life of the trees.

The process which in some cases passes for pruning is certainly bad for the cacaos. Under the pretext of pruning some

¹ Extracts from a series of articles, entitled "Culture pratique du cacaoyer," published in *L'Agriculture Pratique des Pays Chauds*, beginning in April, 1905.

managers of plantations subject the trees to veritable mutilations by using dull and primitive instruments. When I wrote the word "pruning" at the head of this chapter I certainly did not intend it to apply to the barbarous operations I have witnessed in cacao plantations on the east coast of Madagascar. I mean by "pruning" a cultural process, based on reason and directed toward a definite end, resulting in augmented production and longer life of the trees. In short, I am convinced that while pruning the cacao appears to be unnecessary in very fertile soils, it will produce good results in plantations where the soil is of ordinary richness, and it seems to be absolutely indispensable to carefully prune the trees planted on soils that are not very rich.

This opinion is based in part upon observations I have made during my visits to the beautiful cacao plantations of the Antilles and the Guianas, and principally in the Voorburg plantation in Dutch Guiana, directed by Mr. Goefken. This plantation covers an area of 95 hectares, and the trees upon it are in admirable condition.

In the well-kept plantations of this Dutch colony each cacao tree yields an average of 1.5 kilos of dry seeds. The trees are planted at 16 feet, and the mean production of a hectare is 550 kilos of commercial cacao. Mr. Goefken obtains the largest returns; in 1901 95 hectares of cacaos yielded 101,000 kilos of dry cacao. His soil is exactly like that on the other plantations, and he does not manure it. I firmly believe that these excellent results may be attributed solely to very thorough pruning.

Upon the Jagtlust plantation, the largest in Surinam, very large returns are also obtained, sometimes greater than 2 kilos per tree. Manuring is not resorted to, but trimming and pruning are done very carefully.

A cacao that is never pruned surrounds itself with numerous suckers, which become entangled with the branches and shut out the light. The least harm that can result, if the soil is very fertile, is diminution of production, for it is well known that light has a considerable influence upon the fruitfulness of trees. It is probable that even in Ecuador the cacaos would produce more heavily if they were relieved of their suckers. When the soil is of slight or mediocre fertility, allowing the trees to grow entirely without pruning has bad results, since, as was said before, it shortens their lives.

If the development of cacaos that are not pruned is followed, it will be noticed that in a short time one of the many suckers

that surround the trunk begins to develop considerably. It forms a new trunk which grows straight up with extreme rapidity, so that it is soon higher than the top of the tree. The development of the original tree is arrested, and the tops of the branches, deprived of their nourishment by the sucker, gradually die. The branch which has taken the place of the original tree top remains vigorous for two years at most, after which it produces some fruit. As soon as it has lost some of its vigor other suckers appear upon it, developing as it has done, and finally exhausting and even killing it. Thus the tree continues to form a new top about every two years, constantly exhausting itself and producing little. The cacaos that grow in this fashion present a very bad appearance. The extremities of the old branches are dried, the fruit grows smaller as the decrepitude increases, and the yield is small at the age when the trees should be in full bearing.

This is what one sees in an unpruned cacao plantation, and is what leads me to believe that pruning to a moderate extent is indispensable in maintaining the cacao in a satisfactory state of production for a long time. I believe, too, that judicious pruning tends to augment the production to a larger extent. The object in pruning the cacao is the same as in pruning all other fruit trees. The planter prunes in order to regulate and equalize the development of the different parts of the trees, to enable light and air to penetrate freely, to regulate the production, and, finally, speaking particularly of the cacao, to lengthen the tree's life by preventing the excessive production of suckers.

All efforts tend toward clearing out the interior of the tree so as to form a sort of goblet, as is done with European fruit trees of regular form and high trunk. The cacao's special manner of development makes this result easy to attain. At about one year of age, when the young trees are 0.75 or 1.2 meters high, the trunk begins suddenly to branch in a very characteristic manner. At the top a whorl of from three to six branches is formed. These branches grow obliquely and form a sort of vase. There are no exceptions to this rule. The trunk of the cacao is always terminated by a whorl of branches, known under the name of "lélé" at Martinique. The possibility of giving the cacao a particular form is thus limited by its manner of growth. It is very rarely that the planter is called upon to force the young cacaos to put out their first branches.

When the branches are well started and 35 or 40 centimeters long the question of cutting out the superfluous ones comes up. In Surinam three branches are saved—never more than three.

The Dutch planters told me that when the young trees have formed more than three branches, three take the lead and develop vigorously, while the rest are backward in their growth. It is as if the cacao tree itself eliminated them. In Trinidad three branches are usually saved, though where the soil is rich four are sometimes left. In cutting out the primary branches account must be taken of their vigor and their respective positions. The less vigorous are removed. It is not well to wait until the branches are very large, but the Dutch planters of Surinam all agree that it is well, especially when the trees are young, to cut the cacao as little as possible, in order to avoid wounds whose scars are often troublesome.

Topping of cacao trees is almost never practiced in Surinam and Trinidad, but if a tree grows too high before forming its verticil the trunk is pinched back, so that the whorl of primary branches will not stand higher than about 1.2 meters above the ground.

It is generally useless to interfere with the formation of the first whorl. The tree naturally terminates in a number of primary branches, which can be thinned to the desired number. If these first branches develop equally, it will not be necessary to top them, though they usually ramify too abundantly. It is only when the growth is very unequal and one or two branches develop much more rapidly than the others that they should be checked. When such is the case the extremities of the most vigorous should be pinched back, and the more backward ones given a chance to equal them. In short, a perfect equilibrium should be striven for in the primary branches that are to form the framework of the cacao. These primary branches bear leaves that are opposite and horizontal in direction. They tend to branch, therefore, on their lateral sides. When by chance they produce branches on the upper side these should be cut off if they shoot straight upward and tend to become suckers.

Among the branches which develop on the lateral sides of the primary branches the superfluous ones are suppressed, also those which are too near the main trunk, because they would ultimately crowd the center of the tree. They should not be allowed to grow within 30 or 35 centimeters of the trunk. If these secondary branches are too numerous, some are taken off in such a manner that of the remaining ones those on the same side of the primary branches are at least 25 or 30 centimeters apart.

Pruning may stop with this; but if it is desired to perfect the form of the cacao tree, pruning may be extended even to the

third set of branches, the method being the same as that used for the secondary branches—those which are too close to the base being removed, and when necessary those too close together on the lateral sides being thinned out. This is as far as pruning, properly speaking, can be said to extend. The tree has been given its proper form. After this, every two years, the cacao should be carefully trimmed. The trimming should be done by trained workmen. They should cut out the dead branches with great care, and aim always to thin out the interior branches so that light and air will not be excluded from any part.

But while judicious and regular trimming is necessary, it should be recognized that there is danger of overdoing in this regard. In many plantations in Trinidad I have seen cacao trees evidently suffering from too much cutting of their branches. The branches and leaves are the organs of nutrition, of which the tree should not be deprived without good reason. The leaves, as is known, constitute the laboratory in which the tree prepares the nourishment that comes from the roots for the transformation into the elements that accumulate in the fruit. When too many branches are removed, and the leaves, of course, with them, the yield is necessarily reduced, the plant's power of assimilation being reduced. Further, a plant that has been excessively pruned must form new branches and new leaves, thus losing much strength that would otherwise be used for production. In conclusion, I believe, as a general rule, that when the frame of the cacao is formed on the plan indicated above, trimming every two years will be sufficient to regulate the form of the tree, to keep the interior properly out, and to cut off the dead wood.

The elimination of suckers is not necessarily included in the subject of pruning. If they were destroyed only every two years, when the trimming takes place, many of them would be able to do much damage, and in cutting them out large wounds would be made, the healing of which might be a very long and problematic process. The suckers represent an amount of energy that is lost to the tree, and they should be removed as soon as they appear. The laborers usually attend to this when they do the weeding.

It is scarcely necessary to recommend that a very sharp instrument be used for pruning, and the branches cut very close to the trunk, in order to avoid leaving stumps which dry out and often occasion cankers that result in the death of the tree. If for any reason it is necessary to cut off branches of considerable diameter and thus make large wounds, these should always be daubed with tar to protect them from dampness.

The best time for pruning the cacao would seem to be during the cool season, when the activity of vegetation is at the minimum. In actual practice the work is accomplished after one of the two harvests, when there is very little fruit on the trees and they are not yet in flower.

I have said in the preceding paragraphs that suckers should be relentlessly destroyed. But after having condemned these parasitic branches it must be admitted that under some circumstances their presence is useful. When the top of the tree begins to die prematurely one of these suckers growing upon the trunk may be used to form the new top. The most vigorous looking specimen is chosen and all the others eliminated, in order to conserve the strength of the tree. As soon as the development of the sucker warrants, everything above this new trunk is removed, and thus a strong new tree is the result. This method of rejuvenation is much in use in Dutch Guiana.

NOTES ON GINGER.

Compiled by HARRIET HAYES.¹

The mother plant of ginger (*Zingiber officinale* Ros.) is an herb indigenous to tropical Asia, and is cultivated in numerous countries of the Tropics. It grows from 1 to 3 feet high, and the flowers come off on separate branches from the root stalk. Commercial ginger consists solely of the rhizome, a stout underground root stock, known to planters as the *race*, and should not be confused with the true root. The most highly esteemed ginger is that which has these rhizomes in the form of straight "fingers" regularly developed. This well-formed growth is possible only in soil that has been previously well worked and put into good condition.

The requirements of ginger with regard to the fertility of the soil are fairly high. The soil must not be too heavy and not swampy. A sandy loam which is also chalky is most favorable. Ginger is propagated exclusively by means of pieces of rhizomes, which are kept in dry places and which shortly before planting are cut up in bits 3 to 5 centimeters long, each of which must have at least one bud. The fields are laid out in the same manner as a potato field, most suitably with ridges 3 decimeters and furrows 8 decimeters wide. The pieces of tuber are placed on the ridges in holes about 8 to 10 centimeters deep and 25 to 30 centimeters apart. These are well filled up with earth so that the tubers lying in the holes do not decay.

The ground should be, as was said above, well tilled and carefully weeded before planting, for if much weeding is done while the crop is growing, water may come in contact with the rhizomes and cause them to rot. In damp places the soil must be carefully drained, for stagnant water is fatal to successful

¹ Compiled from the following authorities: "Agriculture in the Tropics," by J. C. Willis; "The Tropical Agriculturist," Vol. XXV, No. 2; "The West Indian Bulletin," Vol. IV, No. 1, etc.

culture, the ginger under such circumstances being attacked by black rot, and the rhizomes acquire a bad odor and flavor.

The yield from a ginger field amounts as a rule to from 1,100 to 1,700 kilos per hectare, but it is said that as many as 2,200 kilos per hectare have been gathered. At the present price of ginger a considerable profit per hectare might be expected. The cultivation requires manual labor, however, which makes it too expensive to grow ginger on plantations; moreover, the ginger plants exhaust the soil very much, so that repeated cultivation on the same soil is only possible with a considerable amount of fertilizer.

The harvest commences when the parts which are above the ground are withering, a stage reached usually in from nine to eleven months. If left too long the rhizomes thrown up aerial stems and become tough and fibrous. In removing them from the soil great care must be taken not to break or bruise them. Further treatment always begins with cutting off the roots from the carefully washed tubers. From that point the treatment varies according to the form of the product desired.

Dried ginger.—In dried ginger a distinction is made between peeled or white and unpeeled or black ginger. In preparing peeled ginger only the thinnest possible skin may be removed, as the aromatic constituents are present in the portion just beneath the epidermis. After peeling, the rhizomes are immediately placed in clean water, which should be frequently changed in order to obtain the best color. The pieces peeled during the day are left overnight in water and are then dried.

The drying process requires from five to eight days, during which the ginger loses about 70 per cent of its weight. On a large scale the drying is done in a "barbecue," a paved and cemented surface slightly convex, situated so as to obtain the greatest exposure to the sun's rays. Small planters use a drying hurdle, formed of pieces of wood placed side by side and covered with banana or palm leaves. The ginger should be carefully turned over at least once daily during the process of drying. London brokers report that the ginger must be quite dry in order to be salable on that market. In the case of peeled ginger, great value is attached to a bright and, as much as possible, white color. It has been tried to improve the color of the ginger tubers by chemical agents (chloride of lime, plaster of paris, etc.), but it is very inadvisable to do this.

To prepare unpeeled or black ginger, the rhizomes, after having been carefully cleaned, are placed in boiling water for a few minutes and then dried.

Preserved ginger.—Preserved ginger comes largely from Canton, China. The preparation of preserved ginger takes place in the following manner: The washed, boiled, and peeled tubers are placed in earthenware vessels, and a boiling solution of sugar (1 kilo sugar and 2 liters water) is immediately poured over them. After twenty-four hours this solution is drained off, heated, and poured back into the vessel. This is repeated after two days. The ginger can then be taken out of the solution of sugar and dried or sent away direct in jars.

Oils and essences.—For distillation it appears that certain kinds of ginger are more suitable than others. Shimmel & Co. distill only the African variety imported from Liberia, as it contains two or three times as much oil as Jamaica ginger. For instance, whereas African ginger yields 2 to 3 per cent, Jamaica ginger only yields 1.075 per cent essential oil. For the preparation of unrefined oil of ginger there would seem to be two methods: First, steam distillation of the ground roots and subsequent separation of the volatile oils from the aqueous distillate; and, second, extraction of the ground roots with strong alcohol, with subsequent recovery of the alcohol by distillation, which would leave the ginger oil in the residue along with waxes and other extractives in the form of *essence concrete*.

The necessary apparatus for working the second process consists of a grinding mill, a metal vat, a hand-power screw press, and an ordinary copper still with metal coil condenser. Of course the operation of such a still would require running water, and the size of the apparatus would depend upon the quantity of roots to be treated. Such an outfit would be very inexpensive and easily operated, but would produce crude concentrated extract only. For the recovery and rectification of the essential oil much more elaborate and costly equipment would be necessary.

The equipment as outlined would be all required for treating ylang-ylang, champaca, vetiver, etc., for the preparation of "essence concrete" of these materials. In the initial stages of the industry the concentrated extracts of ginger oil or other products could be put in marketable form in Manila, where apparatus is already installed.

It is also possible to make a separation of the terpines in the production of terpineless ginger oil, although I would imagine from the great differences in quotations on ginger oil and terpine-free ginger oil that the yield of the latter would be very small and the demand for such a product somewhat limited.

Other products.—Extract of Jamaica ginger is made by extracting the ground roots with strong alcohol.

Ginger ale is made by extracting the ground roots with very dilute alcohol or water.

The residue left in the production of extract of Jamaica ginger or of ginger ale is called exhausted ginger and is used as an adulterant in ground spice.

Market prices.—Recent United States quotations for Jamaica unbleached ginger root are 12 to 15 cents per pound (52 to 66 centavos per kilo), and for Jamaica bleached ginger root 16 to 17 cents per pound (70 to 75 centavos per kilo).

Dried root is valued at 20 to 30 shillings per hundredweight (88 centavos to ₱1.32 per kilo) on the London market.

CURRENT NOTES.

PHILIPPINE COPRA CROP.

According to figures which have been recently compiled for the past year by persons in this city interested in this industry, the Philippine Islands produced 1,658,724 piculs of copra, making the Islands the largest producer of this staple in the world, and excelling in product Java, Straits Settlements, Ceylon, and the South Sea Islands. These data not only show that the copra industry in the Islands is in a most healthy condition but that copra has risen to ₱11 a picul. This rise in price has taken place within the past few months. On February 1 it was quoted at ₱10.25 and later advanced to ₱11. The production of copra in the Philippines for the past four years is given as follows:

	Piculs.
1906	927,942
1907	844,909
1908	1,345,166
1909	1,658,724
Total	<hr/> 4,776,741

Approximately 103,000 tons, or about one-third of the world's production, is grown in the Philippines. The reasons for the steady rise in the price of copra are many. The principal ones are the extensive use of its products for commercial purposes, for making edible fats, such as "palmin," also the rise in price of articles now being supplanted by copra products. At the present time there are several factories in Germany engaged in making imitation butter, "palmona," and other edible products from the meat of the coconut. Another item which contributes to the rise in price of copra is the shortage of fats of all kinds due to the scarcity and high price of hogs. Lard, for instance, has risen to about 65 centavos a kilo, which is double what it cost two years ago. Cotton-seed oil, which has been used extensively in place of pork fat, has also risen in price to such an extent that the use of copra products has become imperative. Copra products are also being used as a substitute for tallow.

There is also a growing demand for coconut oil, for which millions of coconuts are being used every year. It would seem that the prospect for the coconut industry in the Philippine Islands is brighter than ever before.

INDUSTRIAL SCHEDULES BY THE BUREAU OF EDUCATION.

One of the most satisfactory moves on the part of the Bureau of Education was the pamphlet entitled "Industrial Schedules" recently prepared and sent out to the division superintendents and supervising teachers in all parts of the Islands. This pamphlet was prepared by the Philippine School of Commerce and requires an investigation of the principal commercial towns, ports, and markets in each province; of the rice, corn, and minor food crops; fruit, oil, and fiber industries; of agriculture in general; the animal industry, forest products, minerals, household industries, manufactures, etc. This work by the supervising teachers and superintendents, which will necessarily consume a great deal of time, will turn the minds of thousands of children in the schools toward the resources of their own country, and especially to the resources of their particular section and community. The character of the industrial work carried on by the schools in the different parts of the Islands we believe should be determined largely by the results of these investigations, and that in most cases the industrial work will naturally be along those lines for which the natural resources of each community furnish the necessary material. While we would in no way make light of the value of intellectual training and culture, in the Philippines perhaps more than in any other territory under the Stars and Stripes should that training be emphasized which makes efficient citizens. We believe that just as definite results should be required from money invested in education as from money invested for any other public improvement.

SAN RAMON FARM.

The Mindanao Herald states that the authorities of the Moro Province have decided to move the provincial prison from Calarian near Zamboanga to San Ramon and utilize the labor in carrying on the work of the farm. The present provincial jail will be used as a municipal and detention jail, and a substantial building of reinforced concrete will be erected for the prisoners on the farm. In this way the Moro authorities believe that they can make the provincial prison a self-sustaining institution. The prisoners will be employed in the cultivation of such crops as rice,

corn, camotes and other vegetables, which will be used for the subsistence of the laborers, as well as in the cultivation of the larger crops of the farm. There are now 5,000 coconut trees in bearing, and 3,000 more trees will begin bearing within the next two years. It is the intention of the authorities to stock the farm with cattle, hogs, and goats of selected varieties. There will also be a nursery which will furnish coconut seed for stocking other plantations in the province. According to the report of the treasurer of the province for the last fiscal year the receipts for the sale of the products from the farm amounted to ₱9,567.55. By this arrangement the farm will be under the control of the provincial secretary, and Mr. C. R. Morales, who has been in charge of it since last May, will be in immediate control of the work as superintendent or assistant to the provincial secretary.

LAKE LANAO COFFEE.

This office is in receipt of the following information, dated January 31, from the president and secretary of the municipality of Malabang in the Moro Province. The higher lands close to Lake Lanao are particularly suited to planting coffee. The Moros have a good crop of coffee about every two years. In 1906 there was ₱125,000 worth of coffee sold in Malabang, most of which was bought by the local Chinese merchants. The coffee in the Lanao country is not cultivated, but grows wild. The Moros do not even clean the ground around it. During the past two years there has been a considerable decrease in the number of coffee plants, as many of them have died off on account of old age and from lack of proper care. The coffee, however, is of superior grade and would give splendid returns on an intelligent investment. The following figures showing the shipments of Lanao coffee from this place for the past three years are approximately correct:

	Kilos.
1907, amount of coffee exported	13,643
1908, amount of coffee exported	3,324
1909, amount of coffee exported	29,795
Total	46,763

These figures do not include the total amount brought to Malabang, as a considerable part of this amount is sold or exchanged locally for other products. The price obtained by the Malabang merchants for the caracolillo bean is from ₱1 to ₱1.10 a kilo. This bean is the pick of the coffee from the Lanao coffee district and amounts to perhaps one fifteenth of the total output.

LIBERIAN COFFEE IN BASILAN.

Dr. J. W. Strong, of Zamboanga, speaking of his experience with Liberian coffee, in the Mindanao Herald of March 5, states that in different tropical countries Liberian coffee has done well where *Coffea arabica* has been destroyed by the coffee leaf disease (*Hemileia vastatrix*). He believes that Liberian coffee is much better adapted to strictly tropical conditions than Arabian coffee, as the former is almost entirely free from the leaf disease above mentioned. While Liberian coffee brings a lower price on the world's market than the Arabian, its freedom from disease makes it well worth considering by prospective coffee growers. Liberian coffee is propagated from seed which should be fresh and in parchment. From fresh seed, say only a week or two old, at least 90 per cent should germinate. In making the nursery the ground should be dug or plowed at least a foot deep and all sticks and stones removed, so that the surface of the soil can be put in good condition. The seed should be planted in drills or broadcast on the surface and then covered with not more than one-half inch of earth. A light shade should be provided that will exclude most of the sun, but admit rain, and during the dry season the nursery should be watered at least every second day. It is about forty-five days before the seed leaves appear, and the young plants should be at least three months older before they are transplanted. After the young plants have a good start the shade can be removed little by little until all has been removed at least two or three weeks before transplanting. The coffee when ready for transplanting can be set out from 2 to 3 meters each way, according to whether it is to be grown alone or as an intercrop with Para rubber. If planted with Para rubber it should be planted 3 by 3 and the rubber trees 6 by 6 meters. The young trees should be shaded for a few days after transplanting. Care should be taken not to injure the tap root, which will be found very long even in quite young plants, and the hole in the ground should be dug deep enough to permit its being planted straight and not doubled or broken off. The first flowering can be expected about thirty months from planting, and there will be succeeding bursts about every two months. There will be some ripe fruit almost all of the time, but the heaviest crops will appear in July and January. The berries should be picked by hand and can be treated as ordinary coffee, either by hand or machinery. With young trees, say three or four years old, from 4 to 7 kilos of dry coffee should be obtained from each 45 kilos of ripe berries. The berries hang on the tree until quite dry, so there is little or no loss from their falling off if they are not plucked immediately

after they ripen. Liberian coffee trees require less pruning than the Arabian, but care should be taken to cut out the suckers or water sprouts. The yield per hectare will, of course, depend upon the number of trees, but from one-half to 1 kilo of dry coffee per tree can be depended on from trees four and five years old. This amount will increase to as much as 1 kilo or more as the trees grow older.

MISAMIS COFFEE.

According to Mr. C. Paredes, of Oroquieta, Misamis Province is forging to the front, and there is a great movement toward developing the resources of that section of the country. Mr. Paredes also states that Mr. Steven, who has been enlisting Filipino laborers for Hawaii, has recently acquired a tract of 1,000 hectares of land along the sea between Misamis and Oroquieta, where he intends to start a large coconut plantation. Business seems to be picking up all along the north coast of Mindanao, and the exports of copra are increasing each year. Some very fine coffee is raised in the foothills of the mountains. The coffee industry is becoming one of the chief industries of the province, and within a few years it is believed that this product will form the principal article of export from that part of Mindanao. Last year 500 piculs were sent out, and this year it is estimated that three times as much will be exported. Thus far the Misamis coffee trees have not been molested by destructive insects like those which have killed many coffee trees in the northern provinces. Back from the mountain ranges the country is very much the same as along the coast—one rolling plain, on which are many Montesco and Manobo rancherias. According to those who have visited this section it rivals the climate and soil found in Davao and the southern part of the island.

PEANUT GROWING IN MALABANG.

Experiments have been made at different times in growing peanuts at this place, where they seem to do particularly well. They have been raised in considerable quantities, and the quality of those grown in each case has been pronounced excellent. The vines are very luxuriant, and the principal farmers here report that carabao and horses thrive on the green tops, and that horses greedily eat even the dry vines and keep in excellent condition thereon. The soil is easily worked and produces a large white nut. The principal drawback which has been encountered thus far with peanut cultivation in this locality is the necessity for strong, tight wire fences to keep out wild hogs, which abound in the vicinity.

THE AGRICULTURAL SCHOOL BUILDING IN BACOLOD.

The agricultural school building at Bacolod has been completed by the contractors, Messrs. Lambert & Co., and inspected by the district engineer for its final acceptance by the province. The construction of this building, which cost only a little more than ₱10,000, is one of the most needed and most commendable enterprises on the part of the provincial authorities in Occidental Negros. Bacolod is in the heart of one of the richest farming sections in the Philippines, and it is therefore highly desirable that the school authorities give special attention to training and education along agricultural lines. The work carried on in the new agricultural school building should be one of the most prominent features of the educational work in the provinces.

SUGAR-CANE PLANTING IN ANTIQUE.

The exceptionally high price of sugar during the past two months has given a great stimulus to sugar growing in the Province of Antique which heretofore has produced only a comparatively small amount of sugar. While the plantings are not so extensive as in other sections of the Island of Panay, the present activity on the part of the farmers indicates that they are awake to the opportunity now offered by the American markets. The principal sugar districts of this province are in the towns of Barbaza, Bugason, Culasi, Pandan, Patnogon, San Remigio, and Tibiao.

MORE TOBACCO BOUNTIES.

Under date of January 15 of this year, the Governor-General issued Executive Orders Nos. 7, 8, and 9, providing for tobacco bounties in the Provinces of Capiz, Occidental Negros, and Ilocos Norte. One thousand pesos per annum is provided for each of the provinces named, which shall be expended for bounties for encouraging the tobacco-growing industry under the rules and regulations made by the Director of Agriculture, with the approval of the Secretary of the Interior. In distributing this money it is to be divided into two parts. The first is to be divided into three prizes—one each of 50, 30, and 20 per cent of the amount. These prizes are for the leaf tobacco to the planters who plant not less than one-half hectare nor more than 10 hectares and produce the largest marketable leaves of tobacco per hectare. The second part of the prize is to be divided into three awards—of 50, 30, and 20 per cent—to the growers who cultivate not less than one-half hectare

nor more than 10 hectares and who sort the tobacco and harvest it in the most uniform manner as regards the size, quality, coloring etc., of the leaves. Growers of leaf tobacco desiring to compete for the prizes must register as competitors with the provincial treasurer of their province at the time of planting or as soon thereafter as possible.

A NEW PLANTATION COMPANY IN NEGROS.

The Polo Plantation Company has been formed in Oriental Negros with a capital of ₱60,000 to start a coconut plantation. The company has acquired about 1,000 hectares of land between Amblan Point and Tanjay, and the work of preparing the land for planting has already been begun. Mr. Henry Fleischer is the managing director of the new company, and in a short time he expects to leave for the United States by the way of Europe, stopping in Ceylon to study the methods of cultivation and the preparation of copra for market in that country. Mr. Fleischer has a tract of land of his own near the new hacienda, upon which there are now growing 21,000 trees, some of which are already bearing fruit.

THE AGRICULTURISTS OF CEBU.

On the 20th of February Governor Jakosalem called a meeting of the agriculturists in the Island of Cebu, the object of which was to organize an agricultural association for the protection and improvement of agriculture in that region. At the opening session, before a large gathering, Governor Jakosalem explained in a few words the object of the meeting, after which there were speeches by Sr. Florentino Rallos, vice-president of the Insular Agricultural Association for the Province of Cebu, and Assemblyman Filemon Sotto. The farmers' assembly unanimously approved the plan presented by the provincial governor, and after some discussion elected the following officers:

President.—Florentino Rallos.

Vice-prcsident.—Florencio Noel.

Treasurer.—Pedro Cuí.

Directors.—Leoncio Alburo, Marcial Velez, Lazaro Osmeña, Cresencio Velez, and Mariano Tevez.

This movement on the part of the agriculturists of Cebu is decidedly commendable, and if rightly carried on and supported will result in great good to the whole island. The members of the Cebu Agricultural Association, while they should first look for the protection of the agricultural interests in their section,

should also give their support and coöperation to every movement which tends to promote the best interest of the community at large as well as of the farmers.

FARM MOVEMENT IN NUEVA CACERES.

According to La Paz, of Nueva Caceres, many clearings have been made along the banks of the Bicol River and some houses and many "casetas" are being erected. The "kaingin" clearings are being abandoned, and permanent crops, such as coconuts, are being planted. A considerable portion of the country, which for some time has been covered with cogon, is now being cleared, and the fields are dotted here and there by farm homes, and many houses are surrounded by cultivated fields, which have been planted with corn, rice, camotes, coconuts, etc. A similar revival of farming has been noted along the Caceres and Iriga Road. According to this paper there are many signs of improvement in which La Paz takes just pride as the result of its campaign for more and better crops, for industrial and agricultural improvements.

AN AGRICULTURAL ASSOCIATION IN BATAAN.

On February 20 the provincial governor, Sr. Mariano Rosauro, called a convention at Balanga of the agriculturists of the Province of Bataan. The convention first listened to the reports of the delegates Sres. Antonio Yazon and Apolonio Mendoza, who represented Bataan Province at the Agricultural Conferences which were held in Manila during the Carnival. Mr. Yazon, who had been elected vice-president of the Insular Agricultural Association from the Province of Bataan, reported on the addresses of the Governor-General and the members of the Commission, also on the various papers and discussions which were carried on during the conferences in Manila, after which Mr. Mendoza gave a report on the trips made by the delegates to the forage factory, the buildings of the College of Veterinary Science at the quarantine station at Pandacan, to the sugar factory of the Luzon Sugar Refining Company, Limited, at Navotas, also to the serum laboratory and the stock farm at Alabang. Following the report of the delegates, Governor Rosauro made a few remarks, expressing his thanks to these gentlemen for their enthusiastic interest in the agriculture of the province as well as for the sacrifice of their time and money in order to attend the conferences in Manila and give the farmers of Bataan Province the benefit of them through such reports. After the remarks by the governor, it was unanimously voted that

a provincial agricultural association be formed for Bataan Province, and the following officers were elected:

President.—Sr. Antonio Yazon.

Directors.—Sres. Apolonio Mendoza, of Balanga; Agustin Paguio, of Pilar; Estanislao Rivera, of Orion; Lorenzo de la Fuente, of Abucay; Roque Consunji, of Samal; Isaac Tangco, of Orani; Mariano Nugued, of Hermosa; Arcadio Jocon, of Dinalupihan; Julian Sareal, of Mariveles; Ildefonso Batol, of Bagac; and Julian Leaño, of Morong.

THE VETERINARY COLLEGE.

The Manila quarantine station occupies a tract of about 15 hectares opposite Nagtajan in Pandacan. Besides the forage factory and the quarantine sheds there are three new buildings to be used for the College of Veterinary Science of the University of the Philippines. These buildings include a lecture hall and laboratory, about 8 by 11 meters, with an attractive porch, all of reinforced concrete. Near by is an operating building about 8 meters square, the larger part of the walls of which are a framework covered with fine wire screen which allows plenty of ventilation. Connected with these buildings is a septic vault, into which will be carried all of the refuse from the laboratory in connection with the lecture room and from the operating building. A short distance to the left of these buildings is a well-ventilated hospital for diseased animals. This building includes an office for the doctor in charge. The hospital is also supplied with a septic vault about 3 by 7 meters, to which all refuse will be carried, so that there will be no danger whatever from contagion to animals kept at other parts of the station. All of these buildings are one-story concrete structures with tile roofs. The grade of the quarantine site is now being filled in to the required level. A bridge has been placed across the estero near the Pandacan church, and a street is being built to the site of the College of Veterinary Science. These new buildings have been specially constructed for this college, designed specially for its classes, and every facility will be afforded for adequate instruction. The college is expected to open in June, the course will be for four years, and upon its completion the degree of doctor of veterinary science will be conferred.

A REFORM IN THE LAND SYSTEM.

At a meeting of the provincial governors held during the first week of February, the Executive Secretary, Mr. Frank W. Carpenter, acting as direct representative of the Governor-General, announced to the provincial governors a complete change in the Government plan for giving titles to lands. The Executive

Secretary stated that we have millions of acres of agricultural lands uncultivated and a large portion of this land is occupied by people who have no perfected title. According to the assessment of 1906 there were 2,795,215 parcels of land declared. Practically all of these declarations were by private parties who claim to be the owners of the same. Up to the present time, or since the organization of the land court in 1903, less than 5,000 titles have been given. At this rate it would take over three thousand years to register all of these holdings, so it is absolutely necessary that some means be provided for expediting this work. In order to do this the Government has decided to make a systematic survey and register all parcels of land within certain districts or municipalities, and will be prepared to present to the legislature at its meeting in October proposed legislation for the proper carrying into effect of the new system of giving titles to lands.

One of the prominent features of this reform of the land system is that the Government will not, except where it is necessary, oppose the giving of titles to land. For example, in cases of the provinces and municipalities occupying lots and lands for governmental purposes it has been decided by the Governor-General that under authority conferred upon him by the provision of Act No. 1890 these lots and parcels of land will be transferred or conveyed to such provinces or municipalities free of charge, giving all title and interest in the same of the Insular Government, subject only to the provision that the provinces or municipalities will use such lots or lands for governmental purposes. It is believed that this action will adequately meet all the needs of the municipalities and the provinces.

In regard to the survey and title to land claimed by private parties above mentioned, it is hoped that the Legislature at its meeting in October will provide laws adequate to meet the needs of the masses of the people who are undoubtedly owners of lands, but have no perfected titles showing their ownership. Under this heading it might be stated that it is the idea of the present Executive that such laws should provide the necessary money to carry on surveys on a large scale, authorizing the Government to pay in the first place all of the expenses incident to the perfecting of titles, including the cost of the surveys and the approval of the plans as well as their publication, but not including the private expenses of litigants and lawyers. On the issuing of titles to owners, such owners will then enter into a contract with the Government to refund in a specified number of years 70 per

cent of the actual cost incident to the perfecting of their titles, the remaining 30 per cent to be paid by the Insular Government, the province, and municipality in equal proportions. In this manner any owner of land could obtain a title to his holding without any cost to him in the beginning, and he will refund to the Insular Government, without any interest, the money covering his share of the actual expenses incurred in making the survey and securing the title through the provincial treasurer in the same manner as land taxes are now collected. In this way each owner will have to pay only a small amount annually, as the cost of registration will be materially reduced by surveying and registering a large number of parcels practically at the same time, which will be a great saving to the Government as well as to the landowner.

This plan when perfected will be one of the greatest steps taken by the Government to provide for and assist in the agricultural development of the country, as with satisfactory titles to their lands our farmers will find no difficulty in borrowing reasonable sums of money from the Agricultural Bank, which since its establishment has been little more than a bank in name on this very account. In conclusion, Mr. Carpenter stated that it is thought to be better both for the people and the Government to grant titles to the holders and possessors in good faith of agricultural lands than to have the Government continue to oppose this class of cases, as it is a well-settled fact that a man with a perfected title to his holding makes a much better citizen, anxious to obey and assist in the enforcement of the laws, who will freely contribute his part of the burden necessary to carrying on the Government.

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS FEBRUARY, 1910.

By the COLLECTOR OF CUSTOMS.

IMPORTS.

EXPOS'RIS.

THE ILOILO SUGAR MARKET.

By José T. FIGUERAS.

FEBRUARY.

The arrivals of sugar in Iloilo from the fields and sugar mills during the month of February amounted to 220,360 piculs. Most of these were in large quantities and consisted of firsts and seconds.

The sugar market for January closed at 7 pesos and 4 reales, which continued until the 3d of February, when it went up to 7 pesos and 5 reales, at which price it continued steady until the 10th, when it went up to 7 pesos and 6 reales; on the 16th the price went to 8 pesos; on the 19th it rose to 8 pesos and 1 real, on the 23d to 8 pesos and 2 reales, on the 25th to 8 pesos and 2½ reales, and on the 28th, the last day of February, to 8 pesos and 4 reales.

February shipments.

CROP 1909-10.

Date.	Vessel.	Destination.	Superior. (piculs.)
February 16	Hunan	Ningpo	9,697
Do	do	Shanghai	8,926
February 19	Sungkian	Hongkong	1,230
Total for February			19,853

Exports up to February 26 for 1908 and 1909.

[In piculs.]

To—	1908-09 crop.		1909-10 crop.	
	Superior.	Wet.	Superior.	Wet.
United States			18,400	
Japan	8,000	5,915		
China	319,739		64,575	
Total	327,739	5,915	82,975	

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

FEBRUARY, 1910.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar, Iloilo.				Rice, Tárlac.				Tobacco.			
	Albay.		Tacloban.		Sugar, Iloilo.		Rice, Tárlac.		Aparri.		San Fern. ando.					
	Tempera- ture. °C.	Rainfall. mm.														
1-----	23.5	37.2	24.4	52.3	24.6	3.8	26.4	-----	22.4	-----	24.0	-----	24.0	-----	24.0	-----
2-----	24.0	9.2	24.4	42.1	23.3	18.7	26.0	-----	21.9	-----	24.2	-----	24.2	-----	24.2	-----
3-----	23.7	15.7	24.4	27.2	24.2	11.7	25.4	-----	21.9	-----	23.1	-----	23.1	-----	23.1	-----
4-----	25.3	0.8	24.8	9.4	25.8	-----	26.1	-----	22.2	5.0	23.8	-----	23.8	-----	23.8	-----
5-----	25.2	44.9	25.0	13.2	26.2	-----	26.6	-----	21.4	3.4	24.2	-----	24.2	-----	24.2	-----
6-----	25.6	8.1	25.9	7.4	26.7	-----	27.2	-----	23.1	-----	24.8	-----	24.8	-----	24.8	-----
7-----	26.4	39.2	25.6	6.1	26.8	-----	27.0	-----	23.9	-----	26.0	-----	26.0	-----	26.0	-----
8-----	26.6	10.7	25.8	7.9	27.3	-----	26.8	-----	24.1	1.4	25.9	-----	25.9	-----	25.9	-----
9-----	26.7	9.5	25.4	18.8	27.6	-----	28.3	-----	23.4	-----	26.0	-----	26.0	-----	26.0	-----
10-----	27.0	7.6	26.0	2.6	26.8	6.9	27.0	1.0	23.3	-----	25.8	-----	25.8	-----	25.8	-----
11-----	26.8	7.9	26.4	-----	26.5	-----	26.6	-----	22.5	-----	25.7	30.5	25.7	-----	25.7	30.5
12-----	24.0	106.6	24.6	18.3	26.4	-----	27.0	-----	21.6	4.8	25.4	-----	25.4	-----	25.4	-----
13-----	24.1	17.9	25.4	5.1	26.8	-----	25.8	-----	22.2	0.8	26.2	-----	26.2	-----	26.2	-----
14-----	26.0	2.8	25.8	4.4	26.7	1.3	27.2	-----	22.8	0.3	26.2	-----	26.2	-----	26.2	-----
15-----	26.7	5.0	26.4	0.8	26.2	-----	28.4	-----	24.1	-----	26.9	-----	26.9	-----	26.9	-----
16-----	26.8	4.6	26.3	3.3	27.0	-----	28.5	-----	25.0	-----	26.6	-----	26.6	-----	26.6	-----
17-----	27.0	-----	27.0	2.5	27.2	-----	30.2	-----	24.9	-----	25.8	-----	25.8	-----	25.8	-----
18-----	27.0	-----	26.8	-----	27.3	0.8	30.0	-----	25.0	-----	25.3	-----	25.3	-----	25.3	-----
19-----	24.6	39.7	25.3	7.7	26.9	2.0	28.2	-----	24.3	-----	26.7	-----	26.7	-----	26.7	-----
20-----	26.2	2.3	25.2	28.4	25.8	-----	27.7	-----	23.9	-----	26.6	-----	26.6	-----	26.6	-----
21-----	26.2	-----	26.0	-----	26.5	-----	26.6	-----	25.3	-----	25.8	-----	25.8	-----	25.8	-----
22-----	26.2	-----	25.9	-----	25.6	-----	26.7	-----	24.9	-----	27.0	-----	27.0	-----	27.0	-----
23-----	25.4	-----	25.9	-----	25.6	-----	27.0	-----	24.9	2.8	24.6	-----	24.6	-----	24.6	-----
24-----	26.4	-----	25.4	0.5	26.0	-----	27.1	-----	24.2	1.3	25.7	-----	25.7	-----	25.7	-----
25-----	27.1	-----	25.8	0.5	25.9	-----	26.3	-----	26.2	-----	26.1	-----	26.1	-----	26.1	-----
26-----	26.2	13.9	26.9	-----	25.8	0.5	26.0	-----	24.6	-----	24.7	-----	24.7	-----	24.7	-----
27-----	27.1	-----	26.2	1.3	26.6	0.5	27.6	-----	24.4	-----	26.7	-----	26.7	-----	26.7	-----
28-----	27.1	-----	25.9	-----	26.2	-----	28.1	-----	25.8	-----	26.2	-----	26.2	-----	26.2	-----

RANGE OF PRICES OF PHILIPPINE AGRICULTURAL PRODUCTS.

Highest and lowest prices of rice, abacá, copra, sugar, tobacco, and corn for the month of November, 1909.

[Note.—75 liters=1 cavan; 63.25 kilos=1 picul; 46 kilos=1 quintal.]

Provinces.	Unhulled rice, per 75 liters.		Abacá per 63.25 kilos.		Copra, per 63.25 kilos.		Sugar, per 63.25 kilos.		Tobacco, per 46 kilos.		Corn, per 75 liters.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Agusan	₱2.00	₱1.50	₱8.25	₱7.25	₱8.75	₱8.75	-----	-----	-----	-----	₱3.00	₱1.00
Albay	-----	-----	₱7.50	-----	-----	-----	-----	-----	-----	-----	4.00	1.25
Ambos Camarines	3.75	1.50	12.00	5.50	12.00	5.00	-----	-----	-----	-----	4.00	2.00
Antique	2.50	1.50	18.00	10.00	-----	-----	5.65	3.00	-----	-----	3.00	1.25
Bataan	3.15	2.50	-----	-----	-----	-----	9.00	3.50	-----	-----	2.00	1.25
Batangas	4.00	2.40	12.00	8.00	9.00	6.00	8.75	4.20	25.00	9.00	4.00	1.80
Bohol	3.75	1.50	11.38	7.60	9.50	6.00	8.75	3.50	25.00	4.00	4.00	1.50
Bulacan	3.00	2.40	-----	-----	-----	-----	8.50	6.00	20.00	12.00	3.00	1.00
Cagayan	4.00	2.50	-----	-----	-----	-----	-----	-----	10.00	3.50	2.00	1.00
Capiz	3.75	1.50	15.00	8.00	10.00	5.50	-----	-----	17.00	4.00	3.00	1.00
Cavite	3.25	2.80	11.00	11.00	6.80	5.50	6.80	4.50	20.00	4.00	3.00	1.00
Cebu	3.75	2.50	15.00	8.00	10.00	6.00	8.00	3.25	16.00	3.00	3.00	2.30
Ilocos Norte	3.00	2.00	-----	-----	-----	-----	6.00	3.00	30.00	5.00	4.75	2.50
Ilocos Sur	3.75	2.00	-----	-----	-----	-----	6.00	3.00	20.00	5.00	3.00	1.00
Iloilo	3.12	1.25	15.00	12.00	10.00	5.00	8.00	5.00	25.00	6.00	4.00	1.50
Isabela	5.00	5.00	-----	-----	9.15	6.00	7.50	4.50	26.00	5.50	3.00	1.25
La Laguna	3.12	2.40	12.00	7.00	8.00	7.00	6.50	4.00	21.00	7.20	4.50	1.50
La Union	3.85	1.00	-----	-----	7.00	6.00	4.00	3.00	-----	5.00	3.00	1.00
Leite	3.50	2.50	13.00	8.70	8.75	5.00	9.00	4.50	40.00	8.00	5.38	3.00
Mindoro	3.50	2.25	14.00	10.00	5.00	5.00	7.00	7.00	15.00	3.00	3.00	2.50
Misamis	4.25	2.00	3.50	8.90	8.75	5.00	4.50	4.50	25.00	5.00	3.75	1.50
Moro	1.50	1.50	14.00	8.25	9.00	6.00	6.00	4.12	25.00	6.00	2.00	1.00
Mountain Province	8.00	3.00	-----	-----	9.00	5.00	5.00	3.00	25.00	4.00	2.50	1.75
Nueva Ecija	2.75	1.25	-----	-----	-----	-----	7.50	4.00	20.00	7.00	6.00	2.50
Nueva Vizcaya	3.12	2.50	-----	-----	-----	-----	7.50	4.00	20.00	7.00	3.20	1.70
Occidental Negros	3.25	1.50	12.00	8.00	9.30	6.00	6.37	4.00	30.00	8.00	3.00	1.50
Oriental Negros	4.00	2.50	15.00	8.00	10.00	6.50	5.50	5.00	20.00	5.00	5.00	2.00
Palawan	3.00	1.00	18.00	12.00	16.00	5.50	8.00	5.00	25.00	5.00	2.00	1.00
Pampanga	3.00	2.25	-----	-----	-----	-----	-----	-----	-----	-----	3.75	2.50
Pangasinan	4.00	1.20	18.00	8.00	8.00	5.00	8.00	4.00	40.00	6.00	4.00	1.50
Rizal	3.12	1.20	13.50	8.00	8.00	5.00	8.00	4.50	18.00	8.00	4.00	2.00
Samar	4.00	2.00	18.00	18.00	8.00	5.00	8.00	4.00	20.00	8.00	3.00	1.75
Sorsogon	3.00	2.50	13.75	8.00	9.00	4.50	8.25	7.00	15.00	8.00	3.00	1.00
Surigao	2.50	1.25	11.00	10.50	8.50	5.00	8.00	4.00	20.00	8.00	2.00	1.00
Tarlac	1.50	1.50	-----	-----	-----	-----	-----	-----	-----	-----	3.75	1.75
Tarabas	4.00	2.00	13.00	6.00	7.50	4.50	8.00	4.50	20.00	6.00	3.50	2.50
Zambales	3.25	1.50	-----	-----	7.50	6.00	7.00	4.00	12.00	8.00	3.50	2.00

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GENERAL.

Agricultural Bulletin of the Straits and Federated Malay States, Singapore.

The Queensland Agricultural Journal, Brisbane, Australia.

The Agricultural Gazette, Sydney, New South Wales.

Journal of the Department of Agriculture of Victoria, Melbourne, Australia.

Journal of the Department of Agriculture of Western Australia, Perth.
Journal of the College of Agriculture, Tokyo, Japan.

Hawaiian Forester and Agriculturist, Honolulu, Territory of Hawaii.

Tropical Agriculturist, Colombo, Ceylon.

The Agricultural Journal of India, Calcutta.

Memoirs of the Department of Agriculture, Calcutta, India.

Natal Agricultural Journal, Pietermaritzburg, Natal, South Africa.

Agricultural News, Bridgetown, Barbados.

West Indian Bulletin, Bridgetown, Barbados.

The West Indian Committee Circular, London.

The British Trade Journal, London.

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Porto Rico Horticultural News, San Juan.

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Bulletin of the Department of Agriculture, Kingston, Jamaica.

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Journal of the Board of Agriculture of British Guiana, Georgetown.

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Progressive Farmer, Raleigh, North Carolina.

Oklahoma Farm Journal, Oklahoma City.

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Kansas Farmer, Topeka, Kansas.

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 Far Eastern Review, Manila.
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 Boletin Oficial de la Secretaría de Agricultura, Comercio y Trabajo, Cuba.
 Boletin de Agricultura, San José, Costa Rica.
 El Haciendado Mexicano, Mexico, Mexico.
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 Revista de la Asociación Rural del Uruguay, Montevideo.
 Prácticas Modernas é Industrias Rurales, La Coruña, Spain.
 Resumen de Agricultura, Barcelona, Spain.

OTHER LANGUAGES.

- Bulletin de la Chambre de Commerce de Saigon, Saigon, Indo-China.
Bulletin Economique, Hanoi-Haiphong, Indo-China.
Chambre d'Agriculture du Tonkin, Hanoi-Haiphong.
Bulletin de Département de l'Agriculture aux Indes Neerlandaises, Java.
L'Agronomie Tropicale, Brussels, Belgium.
Boletim de Agricultura, Sao Paolo, Brazil.
Tamil Journal of South Indian Agriculture, Madras, India.
Station Agronomique, Port Louis, Colony of Mauritius.
Journal d'Agriculture Tropicale, Paris.
Boletim do Museu Goeldi, Para, Brazil.
O Fazendeiro, Sao Paolo, Brazil.
Boletim de Sociedade de Geographia de Lisboa, Portugal.
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- No. 6. The Tamarind. (English.)
- No. 8. Maguey; Propagating Abacá from Seed; etc. (English.)
- No. 9. Agricultural Districts; Control of Rinderpest; etc. (English.)
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- No. 1. Maguey. (English, Spanish, Visayan, Cebuano.)
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Agricultural Review

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EDITORIAL.

DRAFT ANIMALS IN THE PHILIPPINE ISLANDS.

It was manifest to all who were present at the agricultural conferences held during the last Carnival that the subject of draft animals was regarded as a most important problem by the delegates who attended the conferences. As these delegates represented the agricultural interests of a large number of municipalities and provinces, it is certain that this subject is one of vital concern to the agricultural community at large.

It is not difficult for one who is familiar with conditions in these Islands to understand the important place which the draft animal holds in the industrial life of the country. An enormous amount of animal power is required to carry on the agricultural work that is being done, and the available supply of draft animals is by no means equal to the demand. This supply has steadily been reduced from year to year ever since rinderpest was first introduced into the Islands in 1888. The scarcity of draft animals in the early nineties was one of the important causes of the agricultural depression, which resulted in discontent and finally in insurrection against the Spanish Government.

It is a fact clearly recognized by all who have given the subject careful thought that this question of increasing the present supply of draft animals is one of the most important problems that the Government has to solve. Many who are not entirely familiar with the situation often express the opinion that it is a simple matter, and one that requires only the adoption of certain governmental policies. Others appear to believe that animal diseases have become epizoötic in these Islands, and that no amount of effort will ever exterminate them.

The man who is interested in the immediate production of crops or the transportation of supplies is not in a position to wait indefinitely for the final solution of this problem, but imperatively demands that the supply of work animals be increased at once. The need for more work animals is so great and the available means for buying them is so limited that the great majority of farmers in the Islands are never able to purchase enough animals to entirely satisfy their demands. This condition is aggravated by the fact that the prices of live stock are constantly becoming higher and higher. The man who was accustomed to paying from ₱15 to ₱25 for a carabao twenty years ago, is compelled to pay from ₱75 to ₱150 for the same grade of animal at the present time.

As a result of these conditions, numerous suggestions have been offered as to the best means of improving the situation. The most popular of these suggestions is the importation and sale of animals to those who need them for agricultural purposes. The plan frequently advanced is that the Government should import the animals, immunize them against rinderpest, and sell them to the farmers at cost, payment to be made on the installment plan after the animals have been used to produce crops. This method has been tried, has proven to be impracticable, and probably will not be considered again.

The increase of the available supply of work animals that shall meet the current demand, and the consequent restoration of the agricultural industries of the Philippine Islands to their former state of prosperity, will have to come about largely as a result of internal industry and enterprise, although the course necessary to pursue is beset with many difficulties and heavy risks. A satisfactory supply of work animals can only be had when produced in abundance in this country and at prices much lower than the cost at which such animals can be imported. What the Government can do and is doing at a very rapid rate, is to completely eradicate the worst contagious animal diseases, so that investment in herds of cattle and carabaos to be bred and kept on the large unoccupied ranges which are so abundant in the Philippine Islands will prove a safe investment.

An examination of the forest maps of the Islands, prepared by the Bureau of Forestry during the past few years, shows that there are large areas of unoccupied land covered only by grass that are not being used for any purpose whatsoever. Most of these lands are public domain and will not be required for agricultural purposes within the next ten to twenty years. Whenever they lie in isolated localities, such as are found in the Mountain Province, parts of the Cagayan Valley, and in the regions about Sarangani Bay and in Agusan Province in Mindanao, they can be given protection against infection, when once freed from disease, and the cattle industry should naturally go to these places.

Once large herds are established, the available supply of work animals can be brought up to any reasonable limit and the price correspondingly reduced. A single ranching enterprise on the southwest coast of Mindoro recently included a herd of 500 head of cattle and 100 head of horses, all of which were raised at a good profit, and no losses from contagious diseases were sustained on this place for many years. If arrangements could be perfected by which the Government would lease in large areas the unoccupied ranges suitable for stock raising, so as to warrant the equipment and stocking of ranges on a sufficient scale to make it profitable for capital to invest in such enterprises, the draft animal problem would be solved in a very few years.

MR. MERRILL AND THE BAGUIO EXPERIMENT STATION.

One of our leading articles this month is by Mr. M. C. Merrill who, for about two years, has been superintendent of the experiment station maintained by the Bureau of Agriculture near

Baguio. This station was established some eight years ago and has been under the management of several superintendents. Mr. Merrill was at this station a sufficient length of time to thoroughly organize the work, and it is no injustice to the former superintendents of the station to say that he accomplished more while there than any other person who has been in charge. The thoroughly systematic way in which he conducted his experiments is shown by the article which he has prepared on this subject.

Mr. Merrill has resigned his position in the Philippine service and has returned to the United States, where he will take an advanced course at Cornell University. On receiving his doctor's degree, he expects to enter professional work in the United States.

Mr. Merrill came to the Philippines in November, 1906, as an agricultural inspector, and by reason of his energy, careful study of local conditions, and the thorough training which he had received in the United States made rapid advancement. It is a matter of regret that a man whose services were so valuable in the Philippines could not be retained here.

MINUTES OF THE AGRICULTURAL CONFERENCES
HELD DURING THE PHILIPPINE CARNIVAL,
FEBRUARY 7 TO 10, 1910.

(Continued.)

FEBRUARY 8.

Morning session.—The morning session opened at 9 o'clock, with Professor Conner as presiding officer. Doctor Ocampo opened the discussion with a request that the Bureau of Agriculture publish, in all the various dialects spoken in the Philippines, instructions regarding rinderpest, its origin, symptoms, the stages it passes through, and the best methods of treatment. Doctor Gearhart informed Doctor Ocampo that such information regarding rinderpest and the other infectious animal diseases prevalent in the Islands had been published in English and Spanish in THE PHILIPPINE AGRICULTURAL REVIEW for March, 1908. He further stated that the question of curing rinderpest is much less important than that of preventing it. Isolation of the diseased animals in order to protect the other animals from infection is most necessary, for it is the lack of care in this matter, allowing the diseased animals to mix with healthy animals, that causes the disease to spread. In every case, when an animal is found sick, it should be isolated at once.

Sr. González (J.) suggested that the Government import animals, render them immune to rinderpest, and then sell them to farmers, the payments for such cattle to be made in three installments, for the benefit of those who are not prepared to pay the whole amount at once.

To Sr. González's further suggestion that there be corrals established in all the provincial capitals, to which the owners of cattle might bring their animals and have them immunized (a certain per cent of the expense to be paid by the owners) Professor Conner replied that at present all the men who can be obtained are needed to fight the disease where it already exists, and if it can once be eradicated, no such provincial stations will be necessary.

Sr. Carrillo then asked how many kinds of animal diseases

there are at present in the Philippines, to which Doctor Gearhart replied that there are three important animal diseases—*surra*, *rinderpest*, and *septicemia*. Foot-and-mouth disease also attacks animals, but is not so important as the other three. Sr. Carillo proceeded to describe several diseases of which carabaos and cattle have died, particularly one which he said resembled "smallpox," for which he desired to know the remedies, but as these were not at all prevalent and for the most part noncontagious, the discussion returned to the subject of *rinderpest*. Sr. Tiangco spoke of the difficulty encountered in obtaining serum promptly, and suggested that large quantities be made and sent to the provinces to be available when it is needed. Doctor Gearhart replied that the Bureau of Agriculture is constantly trying to obtain better facilities for the production of serum and sufficient money for the purchase of animals for this purpose, and is doing everything in its power to increase the amount of serum available for the farmers.

The question of proper care of animals next arose, Sr. Olaguer claiming that many carabaos die from lack of attention and proper food. It was stated that many animals after working all day are merely turned loose at night, without sufficient food to strengthen them, and are worked again the next day. Many of the carabaos are naturally inferior and susceptible to disease because they are born of parents weakened by this same lack of care. It appeared that an unusually large number of young carabaos are dying. It is most necessary that only good healthy animals should be allowed to produce young.

Sr. Cruz then spoke of the need in the provinces for instruction regarding the diseases attacking animals. He suggested that the veterinarians in charge in the various provinces be instructed to hold popular conferences from time to time, as need arises, when the different diseases found in the towns of the province can be discussed and suggestions given for treatment. Doctor Gearhart stated in reply that the Bureau of Agriculture would be most willing to coöperate in any such undertaking, and he recommended that the delegates present use their influence with the people in the provinces to encourage this idea. It was further suggested that the Filipino school-teachers, with their knowledge of English and understanding the conditions in their provinces, might be used in connection with the conferences.

The necessity for improving the quantity and quality of work animals in the Islands by means of better feeding methods was then touched upon, and the stationing of male animals at the various Bureau of Agriculture stations for breeding purposes

was mentioned, with recommendation that this practice be extended to the northern provinces.

At this point Professor Conner introduced the subject of the proposed trip to Alabang, where the production of serum could be observed in detail by the delegates who were interested in this subject, and arrangements were made for a trip to this place on the morning of February 11.

There was a great deal of interest manifested in the subject of animal diseases, and a number of the delegates wished to prolong the discussion of them, but as the time allotted for this purpose was more than over, the presiding officer recommended that any further points or questions on the subject be put in writing and addressed to the secretary, who would refer them to the proper officials for answer.

Mr. Saleeby's address on abacá then followed, after which there was some discussion of this and allied subjects.

Sr. Zamora inquired as to whether the presence of large trees on a plantation is not prejudicial to small plants, to which Mr. Saleeby replied that, as a rule, no trees should be left on a plantation that are not needed for shade or protection of the abacá from strong winds, but that leguminous trees can be left without danger, because instead of rendering the soil poor, this order of plants enriches it. *Pithecelobium saman* (Benth.) and acacia were spoken of as desirable trees for such purposes. When asked whether the roots of these larger trees did not interfere with those of the young abacá, Mr. Saleeby stated that the abacá roots rarely penetrate beyond a depth of 3 feet, while the roots of larger trees usually go deeper. However, in the case of leguminous trees, whose roots are the means through which nitrogen is deposited in the soil, the roots lying near enough to the surface to interfere with the abacá roots would probably prove helpful, by placing within the reach of the abaca plant the nitrogen which it needs. Nonleguminous trees, with deep-growing roots and small leaves, can be used as shade trees without interfering much with the growth of the plants. Sr. Tempongko asked if shade is necessary for the growth of abacá, or whether it would do as well without shelter, if irrigated sufficiently. Mr. Saleeby replied that shade trees serve two purposes. They not only keep the ground moist, but also protect the abacá plants from destructive winds, and that all plantations located within the typhoon belt should be supplied with shade trees unless protected by natural barriers. As for irrigation, he said that it has been proved beyond doubt that it increases considerably the output and the life of the plant, although it is

not commonly applied. Shade trees serve to keep the soil fairly moist during short dry spells, but in a plantation that is naturally protected, and on which irrigation is possible, shade trees become unnecessary.

Asked if the life of an abacá plantation (stated by Mr. Saleeby to be from twelve to twenty years) might be prolonged by the aid of fertilizers, Mr. Saleeby replied that the use of fertilizer in the ordinary sense is not yet known in abacá cultivation, but that he believes that the period of growth might be considerably prolonged by taking special care in cultivation, and being especially careful in harvesting not to injure the mother plant. Often in harvesting the plant, water collects in the top of the stump and decay begins. This condition naturally affects the young suckers and causes them to rot also. A great many plants are destroyed in this way. As already stated, regular irrigation, special care in harvesting, and proper cleaning, etc., are the means by which the life of an abacá plantation may be lengthened. Often after the plantation is several years old the stalks in the hills will become separated in such a way as to leave a space in the center of the hill, which is usually filled with the woody remains of root stocks of the old stalks and other decayed organic matter. This material becomes the breeding place for insects and other harmful things. To remedy this state of affairs, as soon as the hill shows a tendency to spread out, all this decomposed matter should be removed and replaced by new soil. This operation induces the root stocks to send out new suckers on the inside as well as the outside of the hill, prevents the breeding of insects and disease, and gives more compactness to the abacá hill.

The making of pulp for paper from abacá waste was next discussed at some length. Sr. Madrigal asked whether the abacá stalk, when dried, will yield the same quality of fiber as the waste after stripping. Mr. Saleeby believed that it would be doubtful, and suggested that the difficulty lay in the fleshy part of the stalk, which interferes with the reduction of the fiber to paper pulp. Sr. Madrigal suggested that the stalk might be passed through a mill in order to crush the fleshy part, but Mr. Saleeby stated that it would be difficult to separate the fleshy from the fibrous part in this manner. If the abacá were to be taken apart, sheath by sheath, and the fleshy portion of each sheath removed, the cost would be more than the amount received for the product.

The use of machinery in stripping abacá was spoken of as the only solution of the labor problem in many places. It was

brought out that many people were not able to buy the machines, and the advisability of coöperating, a number of planters putting their money into one large machine, was mentioned.

After some further general discussion and announcements, a committee was appointed by the president to receive and arrange in order any resolutions or suggestions which the various delegates might wish to bring before the conferences, so that needless repetition might be avoided and time saved. Doctors Liongson and Ocampo and Sr. Sandiko were chosen to serve on this committee, after which the conference adjoined until 2.30 p. m.

Afternoon session.—The afternoon session opened at 3 p. m. with Professor Conner again in the chair. Doctor Freer was to have addressed the conference at this time on the production of sugar in the Philippines, but as he was not present Professor Conner requested Mr. Prentiss to make some remarks on the subject. He spoke as follows:

Regarding the cultivation of sugar cane in the Philippines I can tell you very little, but I can, perhaps, tell you something about the cultivation of this plant in Cuba or in the United States, as well as some of the defects observed in the cultivation of sugar cane in the Philippines. For instance, I have remarked that here they set the rows of plants very near to each other, while in the United States they set them at a distance of $5\frac{1}{2}$ feet apart, and in Cuba sometimes they set the plants at 10 feet in the old lands. In the cutting of the cane, I saw in Negros that they do not cut level with the ground, but at a certain height above, while in Cuba the cutting is made level with the ground. By doing so, you succeed in saving what we call rattoons, or the second crop of the same planting, so that in virgin land it is possible to do this for ten years without having to plant again. In plowing the land in the Philippines, also, the planters do not penetrate deeply enough. In the old soils in Louisiana, for instance, the following methods are used: The cane is planted, and the second year the planters grow what we call rattoons; that is to say, the crop which springs from the mother plant; and when this is four years old, they cultivate the land by planting leguminous plants, such as cow peas or sitao, which bring up a certain amount of nitrogen from the subsoil, giving it back the fertility it had lost.

In regard to the making of sugar there is also a great difference, since in the United States the cane juice is boiled under vacuum, and centrifugal machines are used, by which method a better quality of sugar is obtained. I fear that the sugar which is made to-day in the Philippines will not be easily sold in the United States, inasmuch as sugar of 96 degrees test gives about 95 per cent of refined sugar; that of 92 degrees test gives 85 per cent, and that of 83 or 84 degrees test only 70 per cent, so that the makers of sugar have no interest in buying the inferior qualities. I think the sugar makers in the Philippines ought to form associations in order to establish a few central sugar plantations where sugar may be made that will polarize at 96 degrees.

With the mills now existing in the Philippines I suppose that only 60

per cent of juice is obtained, while in the up-to-date mills it is possible to obtain 75 per cent or more of juice, compared with the weight of the sugar cane. I think also that in the Philippines it is not possible to get more than 75 per cent recovery from the juice, while with modern machinery one obtains 90 per cent of the percentage of sucrose contained in the cane juice. In the United States the sugar cane is taken to the sugar house in wagons and is unloaded by mechanical means on the carrier, which takes it directly to the mills. From here the juice goes at once to the liming tanks and from these to the heater, in which the heat rises to 230°. From the heater it passes to the defecators or settling tanks. After settling it goes to the evaporators and from there to the vacuum pans, from here to the centrifugal machines and finally to the packing bags.

If you wish to ask any questions I shall take much pleasure in giving you all the information within my power.

Doctor Liongson asked whether soil conditions would influence the polarization tests, since sugar cane from Iloilo which was planted in Pampanga, and submitted to the same treatment and system of boiling, failed to yield the same degree of polarization as in Iloilo. Mr. Prentiss replied that polarization would not be influenced by the properties of the soil, but that much depended on the treatment of the cane and the methods employed in boiling the juice. He suggested that the quality of lime used in Pampanga might differ from that used in Iloilo, and said that in Louisiana the planters often had trouble in this connection; in one instance, when too much lime was used, they used phosphoric acid to reduce the juice to normal condition, which resulted in a very white sugar. Mr. Prentiss said that he considered centrifugal machines necessary in order to get a proper degree of polarization.

Doctor Freer then delivered an address in English on "Production of sugar in the Philippines." After some remarks of a general nature, Mr. John S. Hord delivered an address on the "Cultivation of tobacco in the Philippines" (which has already been published in the REVIEW for April of this year).

There were a few general remarks at the end of Mr. Hord's address, and the meeting closed for the day.

THE BAGUIO EXPERIMENT STATION.

By. M. C. MERRILL.

INTRODUCTION.

Location.—The Baguio experiment station is located in the tops of the mountains of north-central Luzon at an altitude of approximately 1,500 meters. Baguio is a town the name of which is known from one end of the Philippines to the other, and it is about 5 kilometers north of Baguio, in a basin having very much the appearance of an old crater, that the station is situated. This crater-like basin is known as the Trinidad Valley. The valley's perimeter is more or less circular and its diameter is about 3 kilometers.

Soil and irrigation.—The soil of the valley, according to mechanical analyses that have been made, is composed largely of fine sand, silt, and clay, and, under the classification adopted by the Bureau of Soils of the United States Department of Agriculture, is classified as a fine sandy loam and loam, with a sub-soil ranging from loam to clay loam. The soil on the whole is rather poor in available plant food, thus requiring the use of manures and commercial fertilizers for the satisfactory growth and production of the various crops grown at the station. During the dry season, from November to March, irrigation is carried on, not only at the station, but also on the Igorot rice farms throughout the valley.

Climate.—The rainfall at Baguio during the fiscal year from July 1, 1908, to June 30, 1909, was quite excessive, 185 inches (470 centimeters) having fallen during that time. Nearly three-fourths of that amount fell during the first third of the year, the precipitation from the first of November to the last of June being 52.22 inches (132.64 centimeters). The temperature in this region is delightfully pleasant the year round and is the chief reason for the establishment of the summer capital at Baguio. The maximum temperature during the year referred

to occurred on December, 1908, and was 30.5° C.; the minimum occurred on January 14, 1909, and was 9.0° C. During the greater part of the year, however, the day and night variation of temperature ranged comfortably between 15° and 25° C.

GENERAL WORK OF STATION.

Classification.—The general work carried on at the station may be classified under four heads, namely:

- (1) Investigational, or experimental.
- (2) Distribution of home-grown and imported seeds and plants.
- (3) Growing of crops for demonstration purposes.
- (4) Commercial crop growing, or the production of vegetables, fruits, and flowers for sale, and of forage for feeding the station animals and those at the stock farm.

Reason for growing vegetables at station.—Because of the scarcity of vegetable growers in the country round about Baguio, the Government a few years ago undertook the work of growing vegetables to supply the demand for such, and it has continued doing so ever since. It is hoped that the Government will be relieved of this phase of the station's work before long, and just as soon as there are sufficient private growers engaged in this work to supply the demand the station will cease growing vegetables and fruit for commercial purposes, and its management will then be at liberty to devote more of its time and energy to purely experimental work.

Scope of this article.—As numerous inquiries have been made regarding the various phases of the work of growing vegetables and fruit for the Baguio market, the main purpose of this article is to answer a few of those inquiries by submitting herewith some of the results obtained in this line of work at the station during the fiscal year referred to. This article therefore deals with only that phase of the station's work coming under division No. 4 in the classification given above, and more particularly with that part of it which pertains to the products sold to Baguio buyers. The local conditions as to temperature, rainfall, soil, and irrigation, described in the introduction, should also be kept in mind when considering any of the statements or data given below.

Data and records kept.—Accurate and reliable data were kept during the year on the following points:

- (1) Dates of arrival of seeds or plants at station and whence obtained.

- (2) Germination tests of all varieties.
- (3) Area, dates, and varieties planted.
- (4) Method and rate of planting.
- (5) Kind and amount of fertilizers applied and dates of application.
- (6) Dates of cultivating each plat.
- (7) Dates of irrigating each plat.
- (8) Dates of weeding each plat.
- (9) First and last date of harvest.
- (10) Total yield of each plat and of each variety.
- (11) Total cash sales of each crop.
- (12) Total and exact cost of manual labor expended on each crop for plowing, disk ing, harrowing, leveling, and preparing the plats for planting; for planting the seeds, fertilizing, irrigating, cultivating, weeding, and harvesting the crop. (It should be noted that the work done by the station "vacas" and mules, the delivering of the produce to Baguio, and the cost of superintending the work were not included in the cost of labor for any of the crops.)
- (13) Crop notes showing vigor and characteristics of growth, comparison of varieties, health and size of plants, insect pests, and plant diseases.

The foregoing data are all written up in triplicate on forms supplied by the Bureau of Agriculture, and may at any time be studied in detail by those interested by calling at the office of the Director in Manila or at the station at Baguio.

The data included in this article.—It is manifestly impossible to give all the above-named data in an article of this kind, the length of which must be kept within reasonable limits. Only those items are included in the table below, therefore, which are believed to be of most interest to the general reader, as well as to those engaged in vegetable gardening.

Table showing plantings, yields, sales, cost of labor, etc.

Crop.	No. of varieties.	First and last date planted.	Total area planted.	First and last date of harvest.		Total yield. Kilos.	Selling price. Other units.	Total cash sales.	Cost of labor.
				Hectares.	Kilos.				
Beans	5	{ Jan. 9 (Apr. 13 (Dec. 31 { Feb. 6	{ 0.66 .10 .02	{ Mar. 9 (June 30 (Feb. 13 { June 16	{ 1,710.01 313.31 41.35 10.15		{ 0.25 a. kilo 0.20 a. bunch 0.20 a. kilo 0.50 a. kilo	{ 364.39 97.85 7.74	{ 107.53
Beets	2								26.25
Beet greens									
Brussels sprouts	2								5.31
Cabbage	3	{ Jan. 28 { Jan. 29 { Dec. 31	{ .022 .079 .067	{ June 28 (Apr. 17 (June 16	{ 1,281.6 1,038 heads		0.20 a. head	177.60	15.74
Carrots	3	{ Feb. 5 { Feb. 9 { Feb. 10	{ .067 .080 .080	{ June 12 (May 17 (June 5	{ 167.94 3.81		0.20 a. bunch	24.90	11.10
Cauliflower									
Celery	3	{ Mar. 29 { Mar. 29 { Jan. 29	{ .072 .034 .034	{ June 10 (Apr. 1 (June 30	{ 55.94 582.89 104.25		0.20 a. head	3.20	16.25
Collards	1								
Swiss chard	1								
Sweet corn	3	{ Jan. 15 { Feb. 12 { Feb. 23	{ .28 .12 .052	{ April 14 (May 9 (June 26	{ 337.32 200.39 14.25		0.50 a. dozen	70.00	19.76
Cucumbers	2	{ Jan. 22 { Feb. 24	{ .12 .052	{ May 19 (May 11 (June 26	{ 1,681 134		0.03 each	42.90	7.00
Eggplant	3	{ Feb. 25					0.05 each	5.20	6.08
Endive	1	Mar. 10	.017	{ June 26	20.7		0.50 a. kilo	8.55	1.12
Husk tomato	2	{ Feb. 19 { Mar. 8	{ .11 .025	{ June 14 (May 11 { June 30	{ 40.15 187.78		0.10-0.20 a. kilo	4.00	20.67
Kale	3	Feb. 5					0.10 a. bunch	4.20	4.28
Kohlrabi	2	{ Jan. 6 { Jan. 7	{ .053 .053	{ Mar. 9 (May 28	{ 117.34 11.11		0.40 a. dozen	24.95	9.22
Lettuce	4	{ Jan. 6 { May 11 { Jan. 2 { Feb. 23	{ .053 .068	{ May 8 (June 25 (April 19 { June 11	{ 23.87 2.91 511 plants		0.50 a. kilo	10.83	12.72
Onions							0.20 a. bunch	4.00	6.68

Parsley -----	3 (June 3*)	.006 (Feb. 25)	.006 (June 30)	5.20	130 bunches	0.10 a bunch	10.69	0.62
Parsnips -----	3 (Feb. 5*)	.097 (Dec. 31)	.097 (June 7)	19.84	66 plants	0.20 a bunch	2.20	8.69
Peas -----	3 (Feb. 5*)	.61 (Nov. 30)	.61 (Feb. 8)	1,263.91	-----	0.25 a kilo	289.20	130.15
Pepper -----	4 (Mar. 24)	(Mar. 2)	(Mar. 7)	-----	-----	0.50 a kilo	10.20	13.75
Pumpkins -----	5 (Apr. 20)	.084 (Jan. 21)	.084 (Feb. 12)	16.30	-----	-----	-----	-----
Radishes -----	3 (Dec. 30)	.30 (Apr. 10)	.30 (May 28)	980.94	675	0.05 a kilo	0.83	14.06
Salsify -----	2 (Dec. 31)	.11 (Apr. 12)	.11 (May 25)	586.55	4,642 bunches	0.05 a bunch	137.75	27.25
Spinach -----	3 (Jan. 6)	.064 (Feb. 23)	.069 (*)	113.22	154 bunches	0.20 a bunch	26.80	8.76
Squash -----	4 (Jan. 21)	.18 (Jan. 22)	.18 (May 18)	1,224.2	-----	0.20 a kilo	24.28	7.34
Tomato -----	8 (Mar. 6)	.70 (Dec. 30)	.70 (Apr. 26)	1,324.24	-----	0.10 a kilo	67.66	13.73
Turnips -----	5 (Apr. 10)	.31 (Feb. 13)	.31 (June 28)	1,141.5	1,735 bunches	0.10 a bunch	212.30	110.27
Turnip greens -----	(e) (e)	(e) (e)	(e) (e)	9.3	-----	0.20 a kilo	131.95	47.98
Asparagus -----	(e) (e)	.072 (May 15)	.072 (Mar. 20)	11.41	-----	0.50 a kilo	5.40	17.07
Horse-radish -----	(e) (e)	.006 (May 14)	.006 (June 30)	4.07	-----	0.05 a bunch	4.35	2.32
Huckleberries -----	(e) (e)	.010 (April 19)	.010 (June 21)	1.84	-----	1.00 a kilo	0.32	3.13
Mulberries -----	(e) (e)	.20 (Dec. 12)	.20 (June 29)	164.47	-----	1.10 a kilo	136.07	64.65
Strawberries -----	2 (Aug. 28)	.45 (June 10)	.45 (June 30)	237.13	-----	2.20 a kilo	483.06	246.96

* See following notes.

b 1909.

a 1908.

GENERAL NOTES REGARDING CROPS IN ABOVE TABLE.

Planting and cultivation.—All of the crops given in the above table were planted in rows 9 to 12 decimeters apart, except cucurbits—cucumbers, pumpkins, squash—which were planted in hills 12 and 24 decimeters apart each way, depending on the kind and variety. All crops were cultivated by spike-tooth horse cultivators from two to eighteen times during the year, the number of times varying according to the length of the growing season, as well as to the time of planting. The use of horse cultivators was decidedly beneficial and economical in that it very greatly reduced the amount of hand labor needed to keep down the native weeds and grasses, and also conserved the soil moisture, thus reducing the number of times irrigation was necessary and thereby saving a considerable expense of labor for that work.

Regarding the cost of production.—In comparing the figures in the last two columns of the table, it should be borne in mind that the difference there apparent does not represent the actual gain or loss in each case, as the cost of seeds, and especially of commercial fertilizers, varying kinds and amounts of which were used on all the crops given in the table, would need to be added to the cost of labor to get the approximate cost of production. What was said in a preceding paragraph regarding the cost of labor should also be noted in this connection.

Dates of transplanting.—The dates of planting of Brussels sprouts, cabbage, cauliflower, celery, collards, eggplant, husk tomatoes, the lettuce planted May 11, pepper, and tomatoes, given in the table, are the dates when those crops were transplanted to the field, i. e., the first and last dates of such transplanting. The seeds of all those crops were planted in the open seed bed or in flats in the greenhouse from three and one-half to seven weeks earlier in all cases except the celery, which was eleven weeks earlier. Some of the crops were transplanted once before being set out in the field.

When and whence seeds were received.—Most of the seeds planted during the year were received from Thorburn & Co., New York, although a few for the later plantings of some of the crops came from Australia. The season's planting should have commenced in November, but owing to the fact that the seeds did not arrive at the station until December 27 the planting for the year was correspondingly delayed. As a result, some of the crops did not produce their harvest until the rains had set in, which adversely affected both the quantity and quality of the yield. For brief statements as to the damage done in each case see the specific notes below.

Insects pests and plant diseases.—All orders of insects are to be found about the station, and the keeping of a sharp lookout for their ravages and the immediate and intelligent application of remedies therefor are important factors in the successful production of vegetables, fruits, and other crops. The insects causing most trouble during the year were the following: The "lady-bird sinners" (*Epilachne*), which attacked the Irish potatoes; one of the *Rhynchophora*, which deflowered hundreds of rose bushes and also ate some of the young sweet-corn plants; cutworms of various kinds, which almost destroyed the cauliflower crop by eating off the young plants immediately after they were set out, and which also did a great amount of damage in the same way to the eggplant, Brussels sprouts, and kohlrabi crops. Cabbage, beets, carrots, and turnips were crops that were also damaged to some extent by cutworms. Hand picking, spraying with Paris-green mixture, and applying poisoned bran mash were the principal remedies

adopted. The last named was used only against the cutworms, but its use for that purpose was attended with gratifying results.

Blight, anthracnose, and nematodes, affecting the Irish potatoes, beans, and tomatoes, respectively, were the diseases that caused most damage during the year. In the case of the beans and tomatoes, however, the area planted was so large and the harvest so abundant that the loss of a portion of it by disease was not a very serious matter.

Weighings and size of bunches.—Twelve plants made one bunch of each of the following: Beets, carrots, onions, radishes, salsify, and turnips, and all weighings of the yield of these crops included the tops. Six parsnip plants made one bunch, tops included in weights. A bunch of each of the remaining crops sold by bunches was as follows: Celery, 1, 2, or 3 plants; collards and kale, each 6 leaves; parsley, 6 stems; horse-radish, 1 root ordinarily gave from three to five bunches.

SPECIFIC NOTES REGARDING CROPS IN THE TABLE.

In the following notes each crop is considered separately. The names of the varieties planted are given, and very brief statements are made regarding some of the conditions under which the crops were grown, the results obtained, and other miscellaneous data.

Beans.—Canadian Wonder, Improved Dwarf Golden Wax, Henderson's Bush Lima, Navy, and Warwick. All plantings of beans made during the forepart of season did splendidly, the harvest being large and the quality fine. During the time of frequent showers from April to the end of the year (June 30), the effects of anthracnose began to be very pronounced, and, as a result, dozens and dozens of kilos of beans were discarded as culls after having been harvested and weighed. The anthracnose became so bad toward the close of the year that the harvest of the later plantings was extremely light and so badly affected that some plats were not harvested at all. These facts should be borne in mind in noting the total yield on the area planted.

Beets.—Crimson Globe, Eclipse. Both varieties did only fairly well. Average size of beets harvested was small—about 3.5 centimeters in diameter—but they were tender, crisp, and of excellent flavor.

Brussels sprouts.—Improved Dwarf German, Long Island. Plantings made too late. Harvest therefore small and sprouts inferior because of rainy weather.

Cabbage.—Charleston Wakefield, Improved Early Summer, Newark Flat Dutch. All varieties did splendidly and produced heads that were firm and sound and of fair size and excellent quality.

Carrots.—Half-Long Danvers, Long Orange, Oxheart. All varieties germinated poorly in the plats and crop was correspondingly thin.

Cauliflower.—Extra Early Paris, Large Algiers, Thorburn's Extra Early Snowball. Crop little better than a failure because of cutworms and wet weather before heads matured. Should have been planted earlier in order to avoid the rainy season.

Celery.—Giant Pascal, Improved White Plume, Pink Plume. Planted too late for best results. A considerable amount still unharvested on June 30, and hence not included in the total yield given in the table.

Collards.—Georgia. Grew luxuriantly and produced abundance of leaves, nearly all of which were fed to the station "vacas." Excellent for that purpose, as they are greatly relished by those animals. Not all harvested

by June 30, on which date thousands of leaves were still on the plants and new leaves still growing. Hence the figures in the table represent only part of the total yield of collards.

Swiss chard.—Seeds on more than half of the area given in the table failed entirely to germinate. Two plantings were made—on December 31 and February 23. The first planting grew fairly well, but the seeds of the last planting were the ones which entirely failed to germinate. The total yield was therefore obtained from less than half of the area given in the table.

Sweet corn.—Crosby Sugar, Early Adams, White Evergreen Sugar. But two plantings made. The later one—on February 12—gave somewhat better results than the first planting, the plants being larger, more vigorous, and more numerous on a given area. A higher and more uniform temperature during the growth of the second planting is believed to have partly accounted for the difference. The average size of the ears of all varieties, however, was a trifle less on the second than on the first planting. A considerable part of the ears of all varieties on both plantings were unsalable culs.

Cucumbers.—Early Russian, White Spine. The Early Russian germinated far more poorly than the White Spine, the yield of the first-named variety being correspondingly poorer. The fruit of the Early Russian is also considerably smaller than that of the White Spine.

Eggplant.—Black Beauty, Black Pekin, Early Dwarf Purple. Planted too late. Plants and fruit badly damaged by rains, which greatly reduced the harvest.

Endive.—Old seeds on hand at station. Grew nicely. Only small part harvested by June 30, due to late planting.

Husk tomato.—Cape Gooseberry, Ground Cherry. Plants grew vigorously, especially the Cape Gooseberries. Abundant harvest produced. Fruit splendid for making preserves or pickles, or for eating raw or cooked. Because of late planting, however, only a very small part of the crop was harvested prior to June 30. The Cape Gooseberries sold for ₱0.20 a kilo, while the Ground Cherries sold for ₱0.10 a kilo.

Kale.—Curled Dwarf, Green Scotch, Dwarf Brown Curled, Thorburn's Improved Siberian. All varieties did fairly well. Very little of the product sold. Nearly all of the crop fed to station "vacas," which greatly relished the leaves. Not all of the crop harvested by June 30.

Kohlrabi.—Purple Vienna, White Vienna. Germinated poorly, but the crop nevertheless a fair success. A considerable number of unsalable culs produced, however.

Lettuce.—Big Boston, Black Seeded Simpson, Hanson, and one variety the name of which is not known. First planting a total failure, second planting but little better, due to failure of seeds to germinate. Both plantings made directly in the plats. The third planting made in flats in the greenhouse on April 1, plants transplanted to other flats in the greenhouse on April 20 and 21, and transplanted out in the plat on May 11. This method gave far better returns than by planting the seeds directly in the plats. At the time of transplanting to the plat on May 11, however, the rains were so frequent and heavy that the plants failed to do well.

Onions.—Large Red Globe, Prizetaker, Red Bermuda. Seeds planted directly in the plats. Germinated extremely poorly, and even the few plants that came up failed to grow well. It is believed that better results could

be obtained by planting the seeds in the greenhouse or a seed bed first and later transplanting the seedlings to the plats.

Parsley.—Extra Double Curled, Fern Leaf, and one variety planted before June 3, 1908, the name of which is not known. All the parsley sold during the year was obtained from a few plants raised from seed planted prior to June 3, 1908. No harvest was made from the February 5 planting, although the varieties both grew steadily from the start and became good-sized plants by June 30.

Parsnips.—Hollow Crown, Long White, Student. Germinated so very poorly that harvest was almost nil. Some parsnips were still unharvested on June 30, however.

Peas.—First-of-All, White Marrowfat, and a variety believed to be Telephone. Early plantings grew luxuriantly and produced abundant harvest. Later plantings affected by rains, which decreased the yield almost to nothing.

Pepper.—Chinese Giant, Golden Bell, Ruby King, "Picantes Blancos," "Picantes Morados." Fairly good results were obtained with the first three varieties, all of them bearing a considerable quantity of fruit of good size and quality. Only about half the crop was harvested prior to June 30. The last two varieties were obtained from the Iwahig penal colony. Because of being planted so late in the season, however, these varieties produced no fruit. It appears in the table that more pepper was sold than was harvested. This is due to the fact that a small portion of the previous year's crop was sold after July 1, 1908, the sales being included in this year's account, but the yield of that crop not included.

Pumpkins.—Connecticut Field, Early Sugar, Golden Oblong. Vigorous growth, good yield, excellent quality. Almost all of the pumpkins were fed to the station animals. A considerable amount of seeds of all varieties saved for distribution and future plantings.

Radishes.—Crimson Giant, Early Scarlet Turnip, French Breakfast. All rapid, vigorous growers. Abundant harvest produced. One plat produced two crops during the season. A few rows of radishes planted to mark the rows of slower growing crops. Excellent for this purpose.

Salsify.—Long White French, Mammoth Sandwich Islands. Crop on the whole a fair success. Some plants of the later planting still unharvested on June 30.

Spinach.—Bloomsdale, Long Standing, New Zealand. All the spinach, the seeds of which were regularly planted, was a total failure, due to the seeds germinating so very poorly or not at all. Some New Zealand spinach was grown at the station the previous year, however, and this had gone to seed. As a consequence, volunteer plants came up in various places. These were allowed to grow and from these plants our harvest for the year was gathered, and sales made accordingly.

Squash.—English Vegetable Marrow, Summer Crookneck, White Bush Scalloped, Hubbard. Good results obtained with all varieties.

Tomato.—Acme, Lorillard, Stone, and five small varieties, the seeds of which were saved the previous year. The harvest abundant and the fruit excellent. The supply greater than the demand and hence hundreds and hundreds of kilos of tomatoes ripened and rotted on the vines. Could the plantings have been made earlier all of the harvest would no doubt have been sold because of the numbers of people then in Baguio. But the tomatoes did not ripen sufficiently early to supply the demand of those in Baguio

during the greater part of the season. The first three varieties sold for ₱0.25 a kilo; the small varieties for ₱0.10 a kilo.

Turnips.—Early Snowball, Half-Long White, Teltow, Early Dutch, and one unknown variety. Several plats planted. One plat produced two crops of turnips. Fair results obtained on the whole. Not all of the crop harvested on June 30, and hence that part of the crop was not included in the total yield given in the table.

Asparagus.—Variety not known. Planted prior to 1908. Tops cut off March 15 and sprouts harvested for sixty days. Sprouts rather small, but it is believed both quality and size will improve in coming years.

Horse-radish.—Growing promisingly, having been planted prior to 1908. When roots are harvested, the tops are replanted. Variety not known.

Huckleberries.—A few native plants obtained from the near-by hills and set out in one of the plats to determine if domestication would improve the quality and increase the size of the fruit.

Mulberries.—Several varieties—white, black, etc.—growing here and pruned each year in such a way as to induce fruiting. The plants began bearing for the year on December 12 and continued doing so almost incessantly until June 30.

Strawberries.—Reine de Prairie and a Chinese variety. The Reine de Prairie variety grew rankly, sent out an abundance of leaves, and became a dense, compact plant, but it is a poor bearer, and the berries are small in size, cylindrical in shape, very soft in texture, and only mildly acid in flavor. This variety began bearing on January 21 and continued doing so unceasingly until May 29. The Chinese strawberry grown here has several excellent characteristics—the fruit is large, luscious, and firm, and the plant a most prolific bearer. This variety commenced bearing for the year on December 21 and kept on steadily until June 30. The Reine de Prairie strawberries in one of the plats containing 457 square meters were dug out and another planting of Chinese strawberries made therein on June 10, 1909. This second planting did not bear before June 30, however, and the 457 square meters should therefore be subtracted from the area given in the table to get only the area which bore fruit, because as regards the total area planted the second planting was considered the same as if it had been an original one. The process of replacing the Reine de Prairie strawberries with the Chinese variety is being carried on at the station, and it is hoped soon to have sufficient of this kind to supply all the demand.

NOTES ON SUGAR-CANE GROWING IN HAWAII AND THE SOUTHERN UNITED STATES.

By Dr. G. E. NESOM,
Director of Agriculture.

Location of plantations.—Sugar cultivation in the southern United States extends from North Carolina along an irregular line running southwest through Tennessee, Arkansas, and Texas to the Rio Grande. Nearly all of the commercial sugar is produced in Louisiana and southeastern Texas. Table sirup, however, is produced in commercial quantities in other portions of the South. In Hawaii sugar is grown in the coastal plains and foothills, wherever there is sufficient rain or where water for irrigation may be had.

Climate.—In the Hawaiian Islands the climate is tropical, with the temperature ranging from 4° to 5° C. lower than in the Philippines, and with very irregular rainfall. The range of yearly rainfall is from 0 to 1,100 centimeters (400 inches). In Louisiana the climate is temperate, with occasional freezes, and the rainfall amounts to from 100 to 150 centimeters (40 to 60 inches). In southeastern Texas the climate is almost arid. In general it is semitropical, with occasional frosts.

Soil.—The soil in Hawaii is irregular, broken, and volcanic, varying from steep, rugged lava flows to adobe lands and shallow alluvial deposits. The area under sugar cultivation is about 40,000 hectares. In Louisiana the soils used for sugar cane are the deep, black, rich alluvial deposits along the Mississippi River.

Planting.—Planting is done at any time during the year in Hawaii, but the latter half of the year is preferred. The method of planting employed is to lay the points of the mature cane and whole stalks of immature cane horizontally in furrows, the rows being 1½ to 2 meters apart. In Louisiana, however, the practice is very different. Planting is done in the fall of the year, during the grinding season, usually in November, and it is necessary to plant deeply to avoid freezing. Part of the dirt

covering is removed after the coldest weather (as a rule in February) to permit germination. *Seed cane* is also placed in banks and covered with earth to prevent freezing during the winter. It is planted in the spring and germinates at once.

Cultivation.—In the arid portion of the Hawaiian Islands the land is broken deeply with large steam cable plows, and there is practically no cultivation given after the planting. In districts where there is an abundance of rain and in rough country the lands are broken with mule plows. There are a number of small areas on steep hillsides which are rented to Japanese, and these are dug up by hand. In Louisiana most of the lands are broken and the cane is cultivated by means of modern implements drawn by heavy mule teams. Here the stubble left after cutting the cane receives especial care.

Irrigation.—Irrigation is very generally practiced in the Hawaiian Islands in arid sections and where there is a dry season of any considerable length. The water for irrigation purposes is taken from streams, storage reservoirs, and wells. In Louisiana there is but little irrigation, while in Texas a great deal is necessary. The principal source of the water supply in Texas is the Rio Grande.

Fertilizing.—Heavy applications of fertilizers are made on nearly all plantations in Hawaii, the cost amounting to as much as ₱200 per hectare for each crop. Complete fertilizers are used, and as a rule heavy applications of nitrogen are also made at short intervals. In Louisiana there is but little use of fertilizers.

Harvesting.—In both the Hawaiian Islands and Louisiana the cane is stripped with knives, topped, cut down and thrown into piles. It is not thoroughly cleaned, as there is no serious objection to 2 or 3 per cent of fodder, and it increases the fuel.

Transportation.—Railways are in very general use on large plantations in both Hawaii and the Southern States. In Hawaii the tendency is to lay permanent lines to the principal parts of the fields, so that the cane can be loaded directly upon the cars by hand. Fluming, or the transportation of cane from the field to the mill by means of flumes, is very generally practiced in Hawaii in locations where the country is rugged and the rainfall heavy. It would be quite too expensive to pump water enough for the flumes.

In Louisiana barges are used in the rivers, canals, and bayous to a limited extent. The use of wagons and carts drawn by animals is rapidly decreasing, except for very short hauls.

Yield.—In general the heaviest yields of sugar cane per hectare are obtained from the plantations in arid localities having abundant irrigation and using heavy applications of fertilizer. On some of the plantations near Honolulu the yield is as high as 150 metric tons per hectare.

Milling.—Modern sugar mills have from nine to fifteen rollers about 80 centimeters in diameter and $2\frac{1}{2}$ meters long. The cane is weighed on the cars and dumped into a moving carrier, which brings it into the mill and feeds it into the crusher, which consists of corrugated rollers placed just in front of the first mill rollers. After passing through the mill rollers the bagasse is taken by chain carrier to the boilers, where it is fed directly into the furnaces.

Evaporation and later processes.—The juice goes first to liming tanks, where it is treated to correct acidity, and then it is sent in turn to the juice heater, the settling tank, the multiple-effect evaporators, and to the vacuum pan.

From the vacuum pan the juice is passed to the crystallizers, which may be either plain coolers or arranged to keep it in motion. The resulting sugar is freed from molasses and the washing water by "centrifugals," which are rapidly revolving machines holding about 100 kilos of sugar.

The Hersey driers, which are in general use for the final drying of sugar, consist of a revolving iron shell heated by means of a steam coil placed at one end, and with a blast fan to drive the hot air through it.

Molasses.—"Massecuite" and Iloilo sugar are composed of about four or five parts sugar and one part molasses. In Hawaii molasses is generally worked to a low degree of purity and then thrown away. In Louisiana all the higher grades are sold for table use. All of this product can be used for making alcohol and stock food.

PINEAPPLE GROWING IN PORTO RICO.¹

[Extracts.]

By H. C. HENRICKSEN and M. J. IORNS.

VI.

VARIETIES.

The demand for fruit causes plantings to be made at all seasons with plants of all grades, and as a result fruit is maturing in all months. It is even yet a question whether definite seasons will not come again, but it is probable that a planter by varying the controllable factors can mature most of his fruit at any desired time of the year. From the marketing standpoint this is very important, for he can thus mature his fruit at the season when the prices are best. This will necessitate each planter's keeping careful and complete records of his work and local conditions.

MATURITY OF FRUIT.

The proper degree of ripeness for gathering is very difficult to describe, especially as the fruit begins to mature at base and at core first, so that one portion of the fruit is riper than another. Much depends also upon the length of time necessary to put the fruit into the consumer's hands.

There are several ways of judging the degree of ripeness. These are the development of the crown slips, the eyes, and the general color. As the pine ripens, the crown opens out, the eyes flatten, and the margins round up; the spaces between the eyes open and grow lighter in color; and the little leaflets wilt, then shrivel. As most fruit is picked quite green, only much experience and testing will give one any degree of skill in determining just the condition best for picking. As a rule the more nearly ripe the pine can be allowed to become before gathering, the better the quality; but usually the pine will ripen and color fairly well after being gathered if the eye margins

¹ From The Porto Rico Horticultural News, November, 1909.

PLATE II.—PINEAPPLES GROWING AT LAMAO (UNDER HALF SHADE).





are well rounded, the spaces between show a light greenish yellow, and the leaflets are wilted or withered. If gathered earlier, the fruit may be apparently ripe, but the quality will be poor and usually the color as well. A soft fruit indicates improper soil or fertilizer conditions.

YIELD.

The yield of pineapples is such a varying quantity and dependent upon so many factors that it is almost impossible to make any definite statements. It is the yield in its broad sense of both quality and quantity that determines the grower's success.

FIELD AFTER FRUITING.

How to treat a field after the crop is gathered becomes a complex question where the fruit is ripening over such a long period. As shown under the discussion of fertilizers, as soon as the fruit is gathered the plant should be fertilized. Where fruit matures very irregularly this can be done by having a man go over the field after every heavy picking and fertilize the plants from which the fruit was just gathered. The small expense will be more than gained in growth of slips and suckers.

A second need after fruiting is a thorough cleaning and cultivation. This is difficult to accomplish, as it is not wise, if it can be avoided, to cultivate strongly those plants having fruit nearly mature. Such cultivation may result in renewed growth and yield soft fruit. On the whole, it is best to wait until most if not all the fruit has matured for the thorough cleaning of the field. At the time of cleaning, all diseased and poor plants should be removed and their places, as well as all vacancies, filled with strong, vigorous ones.

At this time some advise cutting off the leaves of the old plants. While it is a good plan to clean the plant from dead or badly injured leaves, it is not advisable to cut others except in special cases. If the field is in such a condition that good work in cleaning can not be done without it, then it may be best to cut off the old leaves. It must be remembered, though, that the leaves are the part that change the elements of the soil and air into food for the plant and any injury to them decreases the amount of food that can be formed in a given time.

As the root system is very shallow, if there has been much washing or working away of the soil, the earth should be thrown into the bed around the plant to the depth of 7 to 10 centimeters. This not only covers the roots, but also helps support the old plant. Care should be used to see that the middle of the bed is kept higher than the sides to assist drainage.

As fast as they mature the slips and suckers should be removed. If all are not desired for planting, then it is well to remove the smaller, weaker ones as soon as possible, thus throwing all the strength of the plants into the ones needed. The number of rattoons and suckers left to bear the next crop depends on the bedding and richness of the soil. Usually two are left to each plant. If the ground is very rich and one expects to fertilize well, three and even in extreme cases four of the best rattoons and suckers may be left. In the single-row system only the rattoons or possibly the very lowest suckers can be left, as any others would probably fall over and either break off or allow the fruit to be sun scalded. In a several-row system the retention of only the lower suckers and rattoons is not so necessary, and the closer the plants the more this is true, but in all cases suckers from near the top should be avoided if possible. Usually, if the upper suckers are pulled off, others will be formed lower on the plant, and even the development of rattoons can often be caused by removing the suckers first formed.

The length of time a field may be kept continuously in pine-apples depends most upon its fertility, but the nature of the soil, the weeds and grass, the system of bedding, and the tendency of the mother plants to propagate by rattoons or low suckers also are governing factors. Where the ground is strong, heavy, and weedy, it is probable that three to four years is as long as the field can be economically continued. In such cases a rotation of three crops of fruit, then a deep plowing and two or three cultivations, then about two good crops of cowpeas, at least one of which is turned under, then another deep plowing and thorough cultivation, followed by replanting with pines will prove very satisfactory. The cultivation and two crops of cowpeas should not take more than eight or nine months and would more than pay for the loss of time. When the other factors can be controlled, a field may be continued from eight to fifteen years, or as long as the fertility is such as to keep them up to profitable size. In Florida this is from five to ten years; in Cuba, five to eight years; and in the Bahamas, in exceptional cases, as much as fifteen years.

MARKETING OF PINES.

To grow a first-class pineapple requires more skill and intelligence than is usually considered necessary, but to market it well requires even more. "Marketing" embraces two quite distinct operations: First, the preparation for the market; and, second, the actual finding of the market, the transportation

thereto, and the selling of the fruit. The preparation of the fruit for the market involves two series of operations—those of the field and those of the packing house.

GATHERING.

In the picking of the fruit, the method of bedding, the variety, and the size of the plants influence the method used. Pineapples, probably because of their appearance, are commonly considered able to stand rough handling. On the contrary, they are very susceptible to injuries, especially in the field before curing, and should be handled almost as carefully as are strawberries or ripe avocados.

Because of the spines, the pickers should wear long-sleeved, heavy canvas gloves, and where they must walk through the pines it is also well to have protection for their bodies.

Stiff bushel baskets are best for collecting the fruit. In the one to five row systems of bedding each picker carries his own basket. In larger beds it is more economical to have extra men to collect fruit from the pickers, regulating the number of baskets, not quantity of pines. Each fruit should be placed in the basket, not thrown or dropped. The Red Spanish can be broken off its stem by a quick sidewise and downward jerk or by placing the knee against the fruit stalk and giving the fruit a quick jerk across the knee. The Cabezonas must be cut off, since, if broken like the Red Spanish, the stem will break deep into the fruit and decay will soon follow. A good way is to cut a long stem with a machete, and then in the packing shed arrange a cutting knife like that used in stores for cutting tobacco, dried beef, etc. Keep the knife sharp so it will make a clean, smooth cut flush with the base of the pine, being careful not to bruise the fruit. All other varieties are treated like the Red Spanish or the Cabezona, depending upon how they break from the stem.

COLLECTING CRATES.

From the picker's basket the fruit is transferred to the crates for transportation to the packing shed. It is here that much fruit is injured by roughness and carelessness. The fruit should be transferred by hand and not dumped or thrown out. Care should be taken also to see that the fruit of one is not crowded against the crown of another, as the punctures caused by the spines afford ingress to spores of decay. The collecting crate should be deep enough to hold not more than two layers and allow another crate to be placed upon it without touching the fruit. The crates should also "nest" into one another so they

will hold firm upon the wagon. This nesting can be easily made by nailing strips around the outside of each crate, allowing the strips to project from one-half to 1 inch above the ends and sides. Care should be taken to see that there are no nail points, slivers, or projections of any kind that can injure the fruit. It is natural, when transportation facilities are not first class, to lay the poor carrying of fruit upon the transportation company. Even if the transportation facilities are poor, it is safe to say that a considerable proportion of the rotting of the fruit is due to injuries received by carelessness in gathering and preparation for shipment.

VII.¹

CURING.

The time necessary for curing depends upon the conditions just before and during picking. If the fruit is picked in dry weather, cooling is the essential factor. The fruit should be put in an open, dry shady place one night, or at the most two. If gathered when moist or during wet weather, as is sometimes unavoidable, then the fruit must be dried as well as cooled, and this will sometimes require three or four days. For this curing set the pines or their crowns base up. This necessitates the curing shed being as cool, dry, and airy as location and construction can make it. Damp and uncured fruit is often shipped, and may carry through in good condition, but it is not safe to take the risk.

GRADING.

It is questionable if it is advisable to make more than one grade for shipping. If a local cannery is available, the culs could be worked up there, as the margin of profit on shipped fruit generally hardly justifies shipping second grade fruit except at times of especially high prices. First-grade fruit should be free from sun scald or other injury, of good form for the type, of proper degree of maturity, and of good quality. Some of these are difficult to determine, but one handling much fruit can, by close observation, grade very accurately. In a strictly first-grade pack the crown should also receive consideration, all the pines being as uniform as possible.

¹ Porto Rico Horticultural News, February, 1910.

AGRICULTURAL CONDITIONS IN MASBATE.

By JAMES C. SCOTT,

Head teacher for the subprovince of Masbate.

Masbate, until November 23, 1905, a province, is now a sub-province of Sorsogon. This subprovince has an area one-half as great as that of Porto Rico, while the Island of Masbate alone equals in size the state of Rhode Island. The change became necessary for economy in administration, and is directly due to the loss by disease of the great number of cattle which only a few years ago grazed on the grass-covered hills and plains and supplied the markets of Manila and adjoining provinces.

In no other part of the Philippines, in regard to economic conditions, may the present be so unfavorably compared with the past; but once free from surra and rinderpest, and with development of the rich mineral and agricultural lands, Masbate will again, in time, take a place among the most prosperous of provinces. Already the number of cattle and other live stock is increasing rapidly. However, epizoötia is still prevalent, and not only causes loss to those who are trying to increase their herds, but discourages others who are considering investment in this enterprise.

Primarily, Masbate is adapted to stock raising. With a nutritive grass covering fully one-half of the entire area and affording rich pasture every month in the year, with springs and rivulets in abundance everywhere, a rancher should find a paradise here. But the complete loss a few years ago of hundreds of herds of cattle, carabaos, and horses, caused the people to look for other means of obtaining a livelihood and it was not till then that the great agricultural possibilities were discovered. But the people had much to learn and the change from the saddle to the plow was not welcomed. Too often the former independent owner of large herds of cattle is now seen living in penury, barely obtaining a living from a hectare or two of corn, tobacco, and coconuts, a tiller of the soil by necessity and not by choice. But others are awake to the change and its possibilities and are planting on a large scale. Newly made "kaīngins" are features in

every locality, the acreage of coconuts is rapidly increasing, corn and rice are grown in larger quantities and tobacco production is becoming important.

All of the thirteen towns of Masbate are located on the coast. Days of travel in the interior of Masbate Island will not reveal a single dwelling. Bancas and sailboats furnish transportation between the towns. The port of Masbate, or Palanog, has one of the finest harbors in the Philippines, and all the other towns may be reached by steamer. Land travel is by means of trails which change with the wet or the dry season or, if along the coast, with the high or the low tides. Traveling by land is difficult, owing to the extensive low coasts covered with manglay and frequently cut by impassable rivers infested with crocodiles. The only good road at present in the subprovince is $3\frac{1}{2}$ miles in length and connects the Aroroy mines with the town on the coast. Surveys have been made for a road across the island from Milagros to Lumbang and one from Masbate to Mobo.

The extent of damage caused by the destructive typhoons of 1908 and the suffering resulting therefrom is not realized by one who has not traveled recently in the subprovince. In the September typhoon trees were completely stripped of leaves and fruit. Coconuts (the principal crop), bananas, and cacao were a total loss for one full year, while all other crops were badly injured, not to mention destruction to other property. This destroyed the food supply. Barrios are found deserted, the inhabitants living in the woods searching for roots and wild fruits to prevent starvation. Those living in the coconut districts suffered most severely. Swarms of locusts appeared in July and August and greatly injured the corn crop, in many cases causing complete loss. At present writing, a year later, scarcely a coconut or banana has been harvested, but the trees are loaded with an exceptionally heavy crop and harvesting will soon begin. The area of cultivated land has been largely increased and the coming year should be a prosperous one.

Reports from all towns indicate loss of fully one-fourth of last year's corn crop from locusts, with much damage done to other crops. The swarms of locusts come to Masbate largely from Capiz and Cebu. A large number are hatched in the extensive unpopulated cogon fields of the Placer and Pulanduta Peninsulas on Masbate Island. The pest will never be exterminated by local authorities without Insular or provincial acid, and interprovincial coöperation and organization on a much larger scale than has so far been attempted. The rewards.

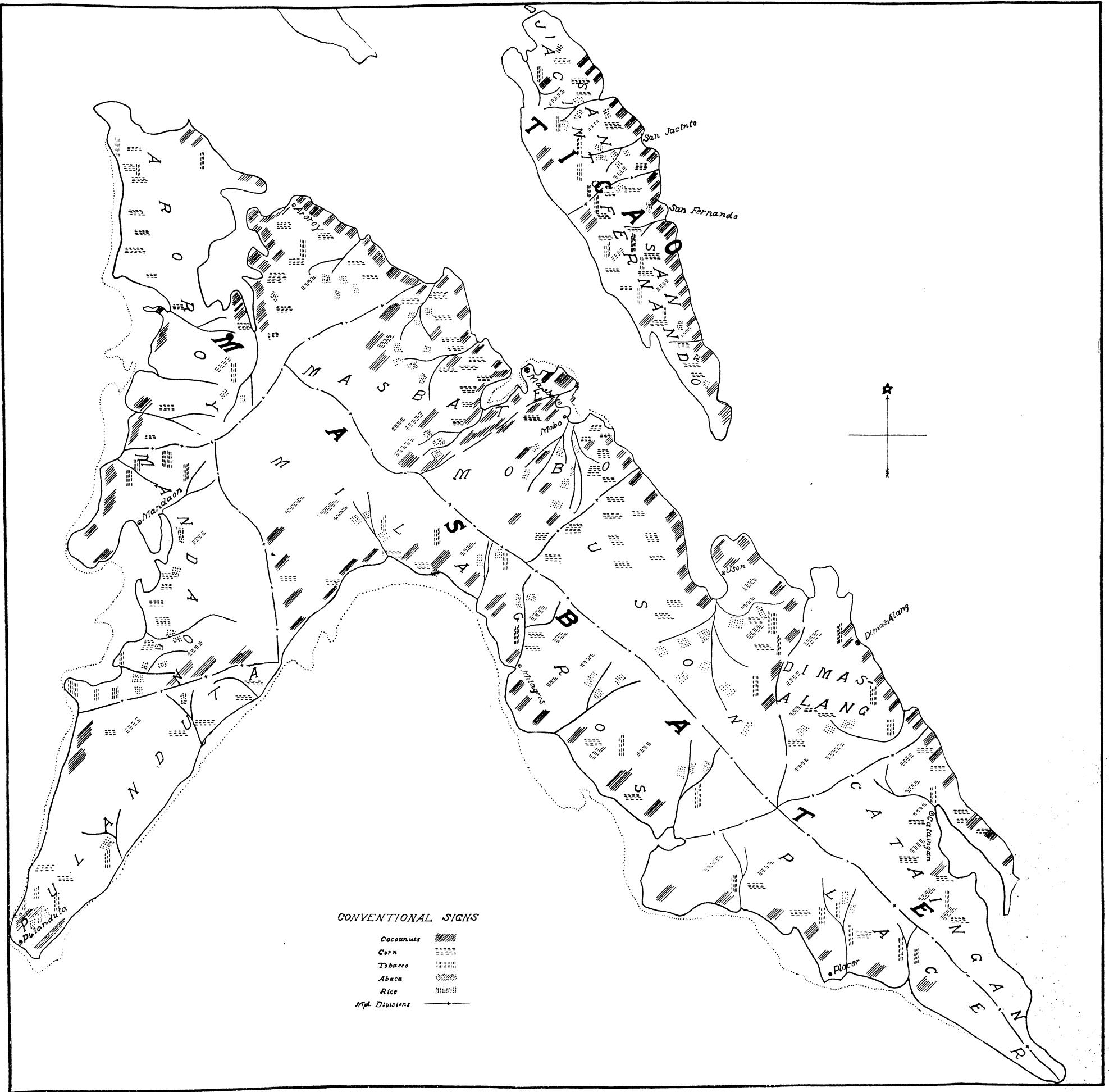


PLATE III.—MAP OF MASBATE SUBPROVINCE, INDICATING THE AGRICULTURAL PRODUCTS OF THE ISLANDS OF TICAO AND MASBATE.

(This agricultural map was prepared by Mr. Alma Beck from maps and original information furnished by the teachers of the schools in the subprovince as the result of personal investigations made under the direction of Mr. J. C. Scott, head teacher.)

ALMA BECK.

offered this year, so much per sack or cavan of locusts captured, served no purpose, except to provide employment for those whose crops were entirely destroyed.

Several methods are used in Masbate in capturing locusts. Nets are used successfully, and pits filled with water with a V-shaped fence or netting opening in the direction in which the young locusts travel, are even more successful.

Coconuts.—Coconuts are grown in nearly all of the towns of the subprovince. One of the best coconut districts of the Islands lies along the coast extending through the municipalities of Uson and Dimas-Alang. The groves are in fair condition, the undergrowth being cut, but not cultivated. In other towns the groves are in a half-wild state. The mistake is made generally of too close planting.

The rhinoceros beetle (*uang*) causes considerable loss at present by boring into and destroying the bud. Crows, which seem to increase year by year, are the cause of more complaint than any other enemy.

Tuba from the groves at Palanas, Island of Masbate, is claimed to be the best in the Islands. Ticao Island promises to become one of the leading coconut areas, and planting continues in all parts.

Rice.—The consumption of rice in the subprovince is comparatively small, and 25 per cent of what is consumed is imported. This is due to the light rainfall and poor irrigation facilities. Much of the land which could be used for rice is left unused on account of the uncertainty of the crop. With the development of irrigation facilities, afforded by the numerous large rivers, and proper cultivation enormous crops of rice could be produced. The Uson and Milagros districts are awaiting irrigation projects to become of great agricultural importance.

The present condition of rice is very good. In several towns harvesting has just been completed with fair crops. Upland rice is raised to some extent.

Sugar cane.—This product grows in a few localities, but rainfall is not sufficient for a heavy growth. Very few mills are in operation.

Tobacco.—Tobacco is raised in sufficient quantities to supply 95 per cent of home consumption and exportation of 15 per cent of the total crop. The farmers understand little of cultivation and curing of this crop. Experiments show that a high-grade leaf may be raised here.

Abacá.—*Abacá* competes with copra as the most important export, and the Island of Ticao leads other localities in this product.

Corn.—Two crops of corn are raised yearly. It is only in recent years that this crop has become of importance. Methods of cultivation are still primitive. The ground is cleared but seldom plowed, and in planting, a hole is made in the ground with a stick during the rainy season and a grain dropped into the hole. A pressure with the foot does the rest. Pulling weeds is the extent of cultivation. Even under these conditions a fair crop is raised. With proper methods two or three heavy crops could be raised yearly.

Other crops.—Camotes and the “camoting cahoy” do well in the subprovince. They are an important item of food during the seasons when other food products are destroyed. Cacao grows well on the hillsides and is quite extensively planted. The kapok tree grows exceptionally well, but little kapok is exported. Maguey has been experimented with thoroughly in all towns, but does not grow well in Masbate, and is now regarded with disfavor by the people generally. Guayabas grow on every uncultivated hillside.

ABACÁ FIBER.

By M. M. SALEEBY, *Fiber Expert.*

STALK FORMATION.

The abacá stalk consists of a fleshy central core and a number of overlapping sheaths. This core is a continuation of the fleshy part of the rootstock, and, as it grows, sheaths are formed on its sides at irregular intervals. When the stalk reaches maturity sheath formation stops; but the core keeps growing and forms what is known as the "flower spike." The central core, therefore, is really the flower stalk, and its sheaths are the petioles of the leaves. This core diminishes in diameter as it rises in the middle of the stalk. Its diameter at the base of the stalk varies from 15 to 35 centimeters, and at the top it rarely exceeds 4 centimeters.

The sheaths are of a crescent shape and are so tightly laid one upon the other as to form one solid mass. They overlap in such a way as to have one of their lateral sides under the preceding sheath and the other above the succeeding one. These sheaths are thickest at the middle and at the base, and diminish gradually toward the lateral edges and toward the top. The width of these sheaths also varies, the fourth, fifth, sixth, and the seventh are usually the widest and thickest. Both the thickness and width depend on the position of the sheath, and range from $1\frac{3}{4}$ to $2\frac{1}{4}$ centimeters and 15 to 25 centimeters in the exterior sheaths to 7 millimeters and 8 to 10 centimeters in the interior sheaths, respectively.

The stalk consists of 16 to 25 sheaths, depending on the variety and extent of growth. None of the sheaths are exactly the same length as the stalk. The exterior sheaths rise from the base of the core but do not extend to the top of the stalk, and the interior ones, which extend to the top, do not rise from the base but at variable intervals above it. The sixth, seventh, and eighth sheaths are usually the longest, varying from $2\frac{1}{2}$ to $5\frac{1}{2}$ meters.

A look at a cross section of the sheath shows that it consists of three distinct, though not well-defined, layers. The outside layer is a fibrous ribbon that contains most and the strongest of the fiber, and is about 4 to 5 millimeters thick. The middle layer consists, for the most part, of a row of cavities separated by longitudinal and transverse partitions or walls. The longitudinal walls contain few fine and white fibers that are weak, but the transverse walls are thin, fiberless, transparent membranes. The third layer is a mass of useless, fiberless tissue, its width rarely exceeding 2 or 3 millimeters.

The outside layer is the one that the strippers separate in three or four strips in the first process of fiber extraction. During the process of separating these strips a part of the fiber in them remains attached to the lower layer; and also when these are pulled under the knife, some more fiber is wasted, of which large quantities can be seen piled in heaps in front of every stripping shed. It is estimated that 30 per cent or more of the fiber of this layer is wasted during the two processes of extracting the fiber.

The fibers found in the longitudinal walls of the cavities of the middle layer as well as the fiber found immediately above is, as mentioned above, both rare and weak. Rope manufacturers object to its presence in the fiber obtained from the upper layer, because during the operation of stretching and twisting, this fiber breaks and collects in a sort of a knob known as "tow spot." It is on account of this fact also that the manufacturers refuse to buy the fiber extracted by machines that save this weak fiber.

DESCRIPTION OF THE FIBER.

Abacá fiber is very light, strong, and of good tenacity. When properly extracted and dried, it is also of a white, shining color. It divides easily into smaller fibers of a regular diameter. Running through its length is a central cavity which is both large and apparent. The walls of this cavity are of uniform thickness, and its form resembles the form of the whole fiber, which is in most cases oval. The end of the fiber tapers gradually and the point is acicular or slightly rounded.

CLASSIFICATION OF THE FIBER.

Softness, color, and strength are the qualities usually considered in grading the fiber. The degree of softness, color, and strength is affected by soil and climatic conditions, by the variety

cultivated, by the position of the sheath in the stalk, and by the manner of extracting, drying, and handling the fiber. In the same soil and climate, and in the same variety, the extent of growth affects the quality of the fiber. The larger stalks contain a coarser, darker, and stronger fiber than that found in the smaller ones.

The fiber increases in softness and whiteness, but decreases in strength, from the outside sheaths toward the inner ones, those around the core being the softest, whitest, and weakest. After every four or five sheaths we invariably find a noticeable change in the quality of the fiber. Given from 16 to 25 sheaths to the stalk, the position of the sheaths will, in itself, be responsible for only four or five grades. But, owing to the imperfect method of extracting the fiber and the lack of care in drying and handling it, we find as many as 17 grades, the lowest five or six of which have no reason to exist.

The following are the standard grades of abacá fiber as known in the American and European markets:

BEST MARKS OR F. E. A. QUALITY.

- (1) 300 per cent over good current.
- (2) 250 per cent over good current.
- (3) 200 per cent over good current.

GOOD MARKS OR F. E. B. QUALITY.

- (4) 150 per cent over good current.
- (5) 100 per cent over good current.
- (6) 50 per cent over good current.

MIDDLE MARKS OR GRADES.

- (7) Good current.
- (8) 75 per cent over fair current.
- (9) Midway.
- (10) 25 per cent over fair current.
- (11) Fair current.

LOW MARKS OR GRADES.

- (12) Superior seconds.
- (13) Good seconds.
- (14) Fair seconds.
- (15) Good red (brown).
- (16) Fair red (brown).
- (17) Daet current.
- (18) Strings.

CONCLUSION.

The principal differences existing among the different varieties of abacá, such as the size of the stalks, the percentage of fiber, and the percentage of each grade in each variety, is clearly shown in the following table. The data contained in these tables were collected from a series of experiments made in different localities in the Davao district. The number of stalks used is three of each variety, and the grading was made by the expert of Messrs. Smith, Bell & Co.

All operations were made by the ordinary native method, and under ordinary conditions. The size of the stalks is above the medium in the majority of the varieties, but other than that, there is no reason whatever why every planter should not obtain the same results, especially in the quality of the fiber produced.

Table No. 1.

Names of varieties.	Total weight of stalks.	Average weight of one stalk.	Average length of stalk.	Average circumference at base.	Average circumference at top.	Weight of dry fiber.	Percentage of fiber.
	Kilos.	Kilos.	Meters.	cm.	cm.	Kilos.	
Tangongon	266	88.67	5	84	40	6.89	2.6
Bangulanon	100.5	33.50	3.8	59	33	2.34	2.3
Maguindanao	259.5	86.50	4.6	84	36	4.40	1.7
Libuton	218.1	72.70	4.3	84	41	3.73	1.7
Arupan	209	69.70	3.9	79	46	3.78	1.8
Puteean	190	63.30	4.1	71	36	3.42	1.8
Sinaba	186	62	4.2	72	43	2.52	1.3
Baguisanon Lawaan	318	106	5.4	87	41	4.53	1.4
Agutay	119.5	39.80	3.8	65	35	1.80	1.5

Table No. 2.

Names of varieties.	Best marks or F. E. A. quality.		Good marks or F. E. B. quality.		Middle marks.		Low marks.	
	Kilos.	Per cent.	Kilos.	Per cent.	Kilos.	Per cent.	Kilos.	Per cent.
Tangongon	1,700	24.75	3,525	50.50	1,660	24.25		
Bangulanon	1,200	50.75	.960	41.25	.180	8.00		
Maguindanao	2,325	52.50	1,800	41.00	.275	6.25		
Libuton	1,065	29.00	1,700	45.75	.715	18.50	0.250	6.7
Arupan	1,515	39.50	1,675	44.50	.590	16.00		
Puteean	2,520	72.50	.540	16.75	.360	10.75		
Sinaba(*)	1,200	47.00	1,200	48	.125	5.00		
Baguisanon Lawaan	2,290	50.00	1,790	39.50	.450	10.50		
Agutay	.775	48.00	.700	39.50	.325	17.50		

* The percentage of the highest grade of fiber in this variety should be much higher than it is. The sample accidentally got wet prior to grading.

Approximate weight and strength of Manila rope.¹

Diameter, in inches.	Circumference, in inches.	No. of feet in 1 pound.	Length of coil, in fathoms.	Weight of coil, in pounds.	Working strength estimated in pounds Not guaranteed.
	(*)	160	1,800	70	250
	(b)	90	1,000	70	375
	(c)	66	720	70	430
$\frac{1}{2}$	(d)	92	400	25	425
$\frac{5}{8}$	(e)	51	400	50	500
$\frac{1}{6}$	(f)	35	300	50	800
$\frac{7}{8}$	(g)	24	200	50	1,000
$\frac{1}{8}$	11 $\frac{1}{2}$	18	200	65	1,200
$\frac{1}{4}$	11 $\frac{1}{2}$	11.6	135	70	1,680
$\frac{1}{6}$	12	10	135	80	1,920
$\frac{1}{8}$	2	8.1	135	100	2,400
$\frac{1}{4}$	2 $\frac{1}{2}$	6.8	135	120	2,880
$\frac{1}{6}$	2 $\frac{1}{2}$	5.5	135	150	3,600
$\frac{1}{8}$	2 $\frac{1}{2}$	4.9	135	190	4,560
1	3	3.6	125	205	5,100
$1\frac{1}{8}$	3 $\frac{1}{2}$	3.1	125	240	6,000
$1\frac{1}{8}$	3 $\frac{1}{2}$	2.7	125	276	6,900
$1\frac{1}{4}$	3 $\frac{1}{2}$	2.3	125	324	8,100
$1\frac{1}{8}$	4	2	125	372	9,300
$1\frac{1}{6}$	4 $\frac{1}{2}$	1.8	125	408	10,200
$1\frac{1}{4}$	4 $\frac{1}{2}$	1.6	125	456	11,400
$1\frac{1}{8}$	4 $\frac{1}{2}$	1.4	125	516	12,900
$1\frac{1}{6}$	5	1.3	125	576	14,400
$1\frac{1}{4}$	5 $\frac{1}{2}$	1.2	125	636	15,900
$1\frac{1}{8}$	5 $\frac{1}{2}$	1.1	125	696	17,400
$1\frac{1}{6}$	5 $\frac{1}{2}$	1	125	756	18,900
2	6	.9	125	830	20,700
$2\frac{1}{2}$	6 $\frac{1}{2}$	.71	125	972	23,700
$2\frac{1}{4}$	7	.68	125	1,140	27,900
$2\frac{1}{2}$	7 $\frac{1}{2}$	.60	125	1,275	32,100
$2\frac{1}{8}$	8	.51	125	1,500	36,900
$2\frac{1}{4}$	8 $\frac{1}{2}$	.45	125	1,700	41,700
3	9	.40	125	1,900	47,100
$3\frac{1}{2}$	9 $\frac{1}{2}$	.36	125	2,150	52,500
$3\frac{1}{4}$	10	.32	125	2,400	58,500
$3\frac{1}{8}$	10 $\frac{1}{2}$	.30	125	2,600	64,500
$3\frac{1}{4}$	11	.27	125	2,900	70,800
$3\frac{1}{8}$	11 $\frac{1}{2}$	.24	125	3,150	77,400
4	12	.22	125	3,400	84,600
$4\frac{1}{2}$	12 $\frac{1}{2}$	.20	125	3,700	91,800
$4\frac{1}{4}$	13	.19	125	4,000	99,000
$4\frac{1}{2}$	13 $\frac{1}{2}$	.18	125	4,400	107,400
$4\frac{1}{4}$	14	.16	125	4,700	115,800
$4\frac{1}{8}$	14 $\frac{1}{2}$	.14	125	5,000	124,200
5	15	.13	125	5,400	132,600

^a 2-thread bale. ^c 4-thread bale. ^e 6-thread. ^g 12-thread.
^b 3-thread bale. ^d 6-thread fine. ^f 9-thread.

The working strength is estimated at 100 pounds to the thread, in a new rope. Breaking strain 50 per cent more.

¹ This table was taken from the Portland Cordage Company's catalogue No. 5, page 9.

PRUNING.¹

Physiology of pruning.—To be an intelligent pruner one must know something of plant physiology. He should know the effects produced by pruning at different seasons of the year, how to make a cut that will heal most readily, and the influence of pruning on the fruit-bearing habit of the tree. * * * It is generally conceded that pruning during the dormant season incites wood growth, while pruning during the growing season promotes fruitfulness. * * *

Although it is said that pruning during the summer season may encourage the formation of fruit buds on tardy-bearing varieties, it may have the opposite effect, unless done at the proper time, and may cause late growth and unfruitfulness. To give the desired results one must prune shortly before the season of growth ends; earlier pruning starts new growth, while late pruning gives no results. The benefit derived from summer pruning seems to depend upon the ability of the pruner to prune at a time to bring about early maturity. In an irrigated section, where soil conditions are easily controlled, the same end may, no doubt, be more easily attained by proper manipulation of the irrigation water.

Both the season at which the wound is made and the character of the cut have an influence upon the healing process. The pruner should remember that all food material capable of healing a wound is taking a downward course through the inner bark, and that to heal well a wound must be in a position to intercept the downward flow of sap from foliage higher up. When a limb is to be removed entirely, the cut should be at the union with and parallel to the surface from which the limb arises. Where limbs are to be headed back, they should be cut to a side limb and not to a bare stub. Wounds naturally heal best when made at a season of the year when growth is most active, but with the possible exception of wounds made in early winter

¹ Compiled from Bulletin No. 139 of the Colorado Experiment Station, and published in full in U. S. Department of Agriculture Farmers' Bulletin No. 388.

and subjected to a long season of drying, the season at which the wound is made has no important bearing upon the healing process. The grower who has a small orchard that will permit of such a practice should delay the pruning until as near the opening of the growing season as possible.

The influence of pruning upon the fruit-bearing habit of the tree has been briefly mentioned, but a fruit-bearing habit may, to a certain extent, dictate a course in pruning. The fruits with which this discussion has to deal have two general types of fruit bearing—from terminal fruit buds and from axillary fruit buds. The first type of fruit bud is well represented in the apple and pear, and the latter in the stone fruits. Varieties which develop axillary fruit buds and bear terminal fruit buds on young spurs all tend to overbear, and require severe pruning. So to a certain extent one can decide for himself how much to prune by observing how the tree bears its fruit.

Treatment of wounds.—The argument in favor of dressing wounds is that it prevents decay and checks evaporation, both of which might interfere with the healing process. Yet, the matter of dressing wounds is not so important but that work improperly done is worse than no treatment. A good lead paint is one of the most satisfactory dressings yet found. Rather a thick paint should be used, and careless daubing of the surrounding bark should be avoided. Grafting wax is a good dressing, but is rather expensive and difficult to apply. Other materials have been used, some successfully and some disastrously, and the grower is to be cautioned about experimenting; better stick to materials known to be safe and efficient. Growers often overdo the matter and waste time treating small wounds.

These suggestions apply to wounds made by the careless cultivator, as well as those made by the pruner. Unsightly wounds and permanent injury may often be avoided by proper treatment of trunk wounds. When the body of the tree is injured, the ragged edges of the bark should be pared off to sound tissue and the whole injury covered with paint or grafting wax. If promptly done, this prevents drying out of the tissues, and new bark will readily form, except on parts where the outer wood cells are actually destroyed, and in time this will grow over. Wrapping the injury with cloth, or if it is near the ground mounding earth up over it will often answer the same purpose.

Pruning tools.—Every pruner should be furnished with good tools; good tools encourage him to do good work. This does not necessarily mean that he must have every tool on the market.

Many of them are useless. It does mean, however, that the ax and a dull saw have no place in the catalogue of pruning tools. The pruner needs a good saw, a good pair of light shears, a pair of heavy shears, possibly a good heavy knife, and, of course, a good ladder. Two common types of saws are found on the market. The common saw with teeth on both edges is a good, cheap one and will answer the purpose in many cases. The various makes of the swivel saws are much handier, however. The blade is stretched between swivels and can be turned to any angle with reference to the frame. It is well adapted to close work in the crotches of the tree.

CURRENT NOTES.

CONDITIONS IN DAVAO.

The Mindanao Herald for April 23 publishes an interview with General Pershing, who had at that time just returned from a trip to Davao and the Cotabato Valley. General Pershing is quoted as follows:

Conditions in Davao have improved very materially since December. At that time there was scarcely a planter who did not complain of a lack of labor. The majority of them were clamoring for the importation of labor from the northern islands. A transport was under charter, engaged in gathering up Filipinos from wherever they could be obtained. The provincial government was paying the expenses of this steamer. With all the effort that was made to import Filipino labor, something like two hundred were brought to the Gulf of Davao. These have turned out to be worthless as laborers and a large number of them have become vagabonds.

Ever since my experience among the Moros ten years ago, I have felt that the solution to the labor problem in the Moro Province is to utilize the labor we find here. When I visited Davao in December, the planters were told that they must work out their own salvation so far as labor was concerned, and learn to handle the hill man. They have evidently gone at it with a determination to succeed, and the result has been admirable.

The Planter's Association has taken hold of the matter, and, with the assistance of the civil officials, it can be said that there are very few planters to-day that have not all the labor they can use. The danger now lies in the planter increasing his acreage too rapidly. The provincial government will continue its efforts to encourage the hill men to learn civilized ways and to establish small settlements in the vicinity of various plantations. Those men who have been successful from the start followed this plan, and others are now doing the same thing.

The new laborers that have come down from the hills during the last six months seem to be very contented, and those who did not bring their families at the start are making arrangements to do so. Each planter has undertaken to provide his laborers with houses and small tracts of land that may be cultivated, and the planters in general are taking a personal interest in the well-being of the hill man who comes to labor for them. To make only a small profit on goods, and to pay the laborers a fair wage in money, are two essentials to success in handling hill labor that the inexperienced planter is beginning to realize. I predict for the American colony in the Gulf of Davao continued progress and success.

I should like to have all investors in this province know that the government of the province stands ready to offer every assistance in obtaining labor for those who have so far been unable to obtain it, and that any new enterprise coming into this province will receive every encouragement.

RINDERPEST UNDER THE SPANISH RÉGIME.

The municipal president of Lucban, Tayabas, has sent to the Bureau of Agriculture a copy of a small bulletin issued in 1888 from the press of Tipo-Litografía de Chofré y Comp., Escolta, núm. 33, entitled "La Epizootia. Cartilla para prevenir á la ganadería de algunas enfermedades comunes." This bulletin was published in parallel columns in Spanish and Tagalog, but there is no intimation as to who was the author. On the last cover page there appears:

NOTA.

Esta cartilla ha sido extractada de la Memoria, titulada: "Una epizootia en Filipinas," y se publica de orden de la Dirección general de Administración Civil.¹

OTRA.

La tirada particular de aquella Memoria se vende al precio de dos pesetas ejemplar en la Agencia Editorial, Carriedo, N.º 2, Manila, y en la Librería de Ntra. Sra. del Carmen, Real de Manila N.º 12.²

The general trend of the text shows that it was intended as a means of educating the people as to the cause and nature of rinderpest and the means of placing it under control. There was but little known about rinderpest in those days and no serum was available as at the present time. About the only remedies prescribed were disinfectants for the premises and purgatives for the affected animals.

RUBBER IN BASILAN.

Mr. F. T. Winters, of Basilan, has a plantation on the Gubanag River, of which the soil is a very rich alluvial deposit. There are about 300 Ceara rubber trees growing on it which are now nearly 4 years old. They were planted directly from seed in July, 1906, at a distance of 15 feet (4.5 meters) apart, and have attained a height of from 15 to 30 feet (4.5 to 9 meters). The trees average 7 to 9 inches (17 to 22 centimeters) in diameter. None of them have yet been tapped.

Mr. Winters has obtained the best results by planting the seed directly in place. His experiments with cuttings, however, have proved fairly satisfactory. About 60 per cent took root and are still doing well. He recommends that care be taken not to damage the cuttings in any way, and after planting they should be

¹ This pamphlet has been extracted from the report entitled "Rinderpest in the Philippines," and is published by the office of the General Director of Civil Administration.

² This report is sold at 40 centavos per copy at the Agencia Editorial, No. 2, Carriedo, Manila, and at the bookstore of Ntra. Sra. del Carmen, No. 12, Real, Manila.

kept moist and sheltered. Mr. Winters states that his observation and personal experience lead him to believe that Ceara rubber should be planted at least 50 feet above sea level and in well-drained land. He gives the following reasons for this: (1) In low lands the trees branch too near the ground, and (2) as the roots of Ceara trees reach to a great depth there is danger from too much moisture, which results in dry rot of the roots, and causes the trees to break off close to the ground.

With older trees he found it necessary to trim off a number of branches each year, as the trees have proved very hardy, needing little care, notwithstanding drought very well, and growing rapidly.

The Moro inhabitants of Basilan are displaying much interest in the cultivation of rubber and are given every encouragement by the government officials.

Mr. C. F. Miller, also of Basilan, states that the Para, Ceara, and Castilloa rubber trees planted by him on that island have all made a very remarkable growth, and promise excellent returns in the future. On this plantation Ceara trees of 4 years 7 months are from 10 to 14 inches (25 to 35 centimeters) in diameter, and Para trees of 3 years 6 months are from 2 to 4 inches (5 to 10 centimeters) in diameter 3 feet from the ground. The Castilloa trees are only 8 months old but are growing very well.

SCHOOL GARDENS IN UNION PROVINCE.

The question of whether the school garden is worthy all the prominence it has been receiving recently, and the extent to which it can be made useful to the Filipino people as a whole, has been the source of much difference of opinion. Mr. North A. Foreman, a teacher in the schools of Union Province, stated, in an address before the agricultural conferences at the last Carnival, that in that province gardening is a part of the work of every primary school. Four thousand children do actual and successful work in these gardens every year. The parents of these children are as a rule of a class that can not be reached by means of bulletins and the other conventional methods of improving farming conditions, and the schools are their only point of contact with outside influences of this sort. The gardens are in reality small farms laid out in smaller fields, each child being given the entire care of his own plot, which he prepares and cultivates and from which he receives the products raised. The planting of home gardens is also encouraged, and hundreds are planted each year. The Filipino teachers are admirably fitted to carry on work of this sort successfully, for they have been trained to understand American ways, and at the

same time they have grown up in the community and are thoroughly in touch with the people and their necessities.

Mr. Foreman believes that by encouraging the children to farm intelligently in ever so small a way, using in their work the tools that their parents have and obtaining better results, the class of products raised and farming methods generally will be greatly improved throughout the country.

PHILIPPINE WOODS IN THE UNITED STATES.

A news note furnished by the Bureau of Forestry informs us that the hardwoods from the Philippine Islands are exciting so much interest in the United States that the chief of the United States Forest Service Office in San Francisco has requested the Philippine Bureau of Forestry to send him a collection of wood samples to be kept on file in his office for the interest of California wood users and to assist in the identification of woods imported from Manila. It is stated that many of the woods found in the Philippine forests can not be excelled for beauty, strength, and other desirable characteristics, and meet with so ready a market in both America and Europe that the amount exported is dependent merely upon the capacity of Philippine sawmills.

The collection selected by Major Ahern contains not only the high-grade first-group timbers such as tindalo, narra, camagon and molave, whose exceptional beauty and durability have become well-known in all the lumber markets of the world, but also the softer woods which, contrary to popular ideas, are produced in the Islands in great bulk. Among these are tanguile and red and white lauan. These latter, especially tanguile and red lauan, while neither so hard nor durable as most of the woods of the first or second groups, have a beautiful color and grain, and are exported to the States as substitutes for mahogany. But not only are they adapted for cabinet making and interior finishing, but their cheapness and comparative ease of exploitation permit them to compete with Oregon pine and other structural timbers of the United States and Europe.

PROSPECT FOR CATTLE RAISING IN MINDANAO.

General Pershing, on his recent trip through Davao and the Cotabato Valley, is reported by the Mindanao Herald (April 23 and 30) as being most enthusiastic over the prospects for raising cattle in the region about Sarangani Bay. He stated that the country around this bay is especially adapted to grazing, and he believes that the pasture lands there are sufficient to supply

cattle for the whole Archipelago. He considers it a splendid opening for some one who understands handling cattle. "The country," he said, "abounds in clear, cool streams, without the usual accompaniments of swamps and marshes. In fact the country around Sarangani Bay reminds one very much of a stretch of country in northern Montana. It is ideal for stock." The land in question extends from the bay inland a distance of about 50 miles toward Lake Buluan. The relative location of the hills and mountains is such that precipitation takes place in the higher altitudes, and the rainfall of the lower land is less than in any other part of the Philippines. Many streams flow through this section, however, yielding a bounteous supply of water. The grass which grows here is much like the grama grass of New Mexico and Arizona. While Governor Pershing was at Glan, a small port near the entrance to Sarangani Bay, he saw a herd of about 100 cattle feeding on the grass, which were sleek and fat. Rinderpest is said never to have appeared in this part of Mindanao, so with proper precautions there should be no trouble from this source.

Governor Pershing suggested that in raising cattle native cows might be purchased at the beginning at a much lower price than imported cows, and they would probably be better adapted to the climate. The Bengali breed have been crossed successfully with Philippine cattle, producing a strain that will weigh 10 per cent more than the native animal. Bulls of this breed could be imported from India at about ₱200 per head. The resulting half-breed heifers of this cross should then be bred to Hereford or Shorthorn bulls.

NOTES FROM OTHER FIELDS.

JAPANESE PEANUT INDUSTRY.

Vice-Consul-General E. G. Babbit, of Yokohama, furnishes some interesting data regarding the peanut industry in Japan, which were published in the Monthly Consular and Trade Reports for March, 1910. He states that in 1908, 6,218,771 pounds¹ were exported, with a value of \$221,570,¹ as against an exportation of 10,185,181 pounds in 1907, with a value of \$352,673. He says:

The latest Government statistics covering the peanut industry—cultivation and production—of Japan are for the year 1907, when 14,825 acres¹ were under cultivation, which yielded 1,302,957 bushels¹ of nuts, of which 1,009,725 bushels were produced in the Yokohama consular district. According to the official returns for the three years preceding 1907, the decrease in production per acre has been very large, as will be seen from the following statement:

Year.	Acres.	Bushels.	Value.
1904 -----	13,579	6,619,360	\$3,955,730
1905 -----	13,362	2,999,190	1,792,321
1906 -----	21,858	1,855,545	1,108,874
1907 -----	14,825	1,302,957	

Planting begins in April and May, and the dry sandy soil which is found poor for other crops is suitable for the cultivation of peanuts. The nuts used for planting are soaked in water for several days and planted in furrows 2 to 4 feet¹ apart, according to whether the variety is of the dwarf and upright or the creeping and spreading kind. Two or three nuts are planted in each hole, with fertilizer, and germinate in about ten days. The cultivation is not difficult, but water and fertilizer are necessary if the weather is not propitious, and the soil must be soft and loose, and kept free from grass.

The leaves turn, in November, to a yellowish white, and the plants are then pulled or dug and hung over the branches of trees or on trellises to dry; this usually continues during a week, when the pods are separated from the leaves and stems and cleaned with water, after which they are again dried by spreading upon mats in the sun.

Practically no machinery is used in the planting, cultivation, cleaning, or packing of peanuts in Japan. The only machine discovered in this

¹ 1 pound=0.45 kilogram; \$1 U. S. currency=¥2; 1 acre=0.4 hectare; 1 foot=0.3 meter; 1 bushel=35 liters.

vicinity was a primitive winnow, the ordinary method of separating the chaff from the pods being that of fanning, requiring the labor of two persons, where a simple machine operated by one person would do the work much more quickly and better.

The nuts are packed, usually in straw bags, which have already done similar service for rice, usually containing 133 pounds, but peanuts for export are generally packed in gunny sacks of 100 pounds. The peanuts, as shipped from the districts where grown, are not baked, and it is only by the retailers, confectioners, or consumers that this is done. The baking is done by a very simple machine, usually charcoal-heated, the nuts being kept in motion by rollers turned by hand.

The crop is usually classified into best, medium, and ordinary, and the first two grades are promptly bought up by the earlier buyers. The lower grades are sold or retained for the purpose of manufacture into oil and oil cake. Occasionally, when the pods are discolored but the nuts are otherwise good, they are shelled and sold as shelled nuts in the local markets, where they are largely used in the confectionery trade.

There is a considerable peanut-oil industry in Chiba-Ken, the only prefecture from which statistics are available, but as this is one of the principal districts where peanuts are cultivated the figures can be taken as representative of the whole trade. The output of this district in 1907 was 32,021 gallons¹ of oil, valued at \$15,221, and 767,241 pounds of oil cake, valued at \$9,599, as compared with 42,885 gallons of oil, valued at \$21,622, and 771,467 pounds of oil cake, valued at \$11,878, in 1906.

This is conducted largely as "home industry," there being not more than five factories engaged therein as a "principal business," and of these only one is at present engaged in peanut-oil manufacturing. This factory is located in Chiba-Ken and uses a 16-horsepower engine.

The following statement shows the cost of manufacturing: Peanuts required for pressing out 48 gallons of oil, \$35.36; wages, receptacles to hold the oil, and freight to Tokyo, \$1.55; total, \$37.41. Price of 48 gallons of oil, \$27.39; by-products, \$11.20; total, \$38.59. Net profit, \$1.18.

The market price in December, 1909, of oil and oil cake was as follows: Oil, superior, 48 gallons, \$32.37; common oil, \$27.39; oil cake, per 8.27 pounds, 11.2 cents. The oil is packed, as is the petroleum sold throughout Japan, two cans to the box, this packing costing about 18 cents.

FERMENTATION OF CACAO.

Regarding the fermentation of cacao, the Tropical Agriculturist for February, 1910, publishes the following information (translated from the German of Fickendy) :

In the preparation of cacao the author distinguishes between two distinct processes, on the one hand the fermentation of the pulp—the sweet slimy substance in which the beans lie embedded in the fruit—and on the other the changes which go on in the bean itself, and really have nothing to do with fermentation or are only indirectly related to this process.

The purpose of fermentation is mainly to kill the beans without destroying the enzyme. The proof of this is that the most important changes which appear after fermentation, in the form of the brown coloration of the nibs and the reduction of the bitter taste, are also produced without fermentation

¹ 1 gallon=3.78 liters.

if the beans are killed under conditions which do not destroy the action of the enzyme, e. g., by alcohol, by freezing or by grinding the beans to a pulp.

The production of a brown color and the reduction of the bitter principle in cacao are genuinely related processes. The bitter taste depends upon the presence of tannins, and the brown color has its origin in the oxidation of these tannins. It is easy to prove that an oxydase plays a part in the fermentation of cacao. If the cacao beans are heated the appearance of the brown color and the loss of bitterness alike fail, whereas after heating for an hour to 70° C. the change of color still takes place. The brown color can still be produced in beans heated to 75° C. if a small quantity of watery extract of fresh cacao beans is added. For comparison one may treat another portion of beans with a similar extract which has been previously heated to 80° to 100° and the change of color fails to appear. A similar brown color is produced in a pure solution of tannins by unheated cacao-bean extract, the discoloration commencing at the surface.

On the basis of these observations the following recommendations are made with regard to the practical treatment of cacao.

(1) In drying the temperature should not be allowed to rise above 60° to 70°.

(2) When fermentation is completed the cacao beans should be passed through a 5 to 10 per cent solution of potash before drying. In this way a removal of acid from the cacao is brought about which then encourages a further action of the enzyme and consequently a sweetening of the product. Cacao prepared in this way is also markedly more soluble and capable of suspension.

INDO-CHINESE RICE AND THE PHILIPPINE MARKET.

The Bulletin Economique for January-February, 1910, contains a very interesting note concerning the relations of the Philippines and Indo-China with regard to rice. Much of the information in the article is given by M. Bertrand, the French consul in Manila. Half a century ago, it is stated, there was not only enough rice produced in the Philippines to meet the needs of the people, but there was also a certain amount exported. But later, owing partly to the increase in the population and the preference accorded the cultivation of other products, and to numerous other causes, the exportation ceased, and the Archipelago soon began to import rice from neighboring countries, which it has been doing ever since.

Importation of rice from Indo-China began in 1872, but did not assume any great importance until 1885. At this time Indo-China, the British Indies, China (or more accurately Hongkong, and the rice exported from Hongkong was obtained from Indo-China, Siam, or Burma), and Siam, were all competing for this new market. Indo-China gradually assumed the chief place and has held it ever since except for the year 1900, when her exports of rice fell below those of China. Since 1900 the Philippines

have imported 2,017,619 tons of rice, representing a total value of 306,686,244 francs (about ₩122,674,497), of which Indo-China supplied 1,410,625 tons, with a value of 214,985,139 francs (about ₩85,994,055). Indo-China, then, has furnished 69.91 per cent of the quantity, and 70 per cent of the value of rice imported into the Philippines since 1900.

Regarding the tariff provisions recently enforced in the Philippines in connection with the importation of rice, M. Bertrand believes that no alarm need be felt, as this tax applies to all countries alike. The increased duty will not make any serious difference, for rice must be imported into the Philippines just the same, and attention is directed to the fact that the import duty is just as high on rice brought from America as that from other countries. The high cost of production of rice in America and the expensive freight rates will prevent any serious competition with the Indo-Chinese product in the Manila market. The danger to the Indo-Chinese rice trade, however, lies not so much in the possible increase in production in the Philippines as in the keen competition with Siam, Japan, and the British Indies. China is scarcely reckoned as important because on the whole she is an importer of rice, not an exporter. M. Bertrand does not anticipate any great increase in the production of rice in the Philippines, partly because the people are turning to other kinds of products which do not demand such hard labor, and yield a more immediate and higher profit, and because the cost of labor is increasing.

M. Lemarié, the present chief of the agricultural service, is of the opinion that the present trouble in the Islands is due to the shortage of draft animals, and that if the people apparently prefer other cultures to rice culture it is because these require fewer animals of this sort. When the stock of draft animals shall have been increased again, or when machinery shall have been installed in their place, he thinks that rice will once more assume its former important position.

Another authority, M. Fettere, chief of the commercial and industrial service, contends that the danger to Indo-Chinese rice traffic lies in the fact that the duty and consequently the price of rice has become so high that the consumption will decrease, and wheat and other products will be used to greater and greater extent in its place, since the duty on these products is so much lower.

TOBACCO IN THE PHILIPPINES IN 1908-9.

The following statement, furnished by the Collector of Internal Revenue, shows by provinces the area of land in the Philippines cultivated in tobacco and the amount produced during the year 1908, also the estimated production for 1909. These are the latest statistics available.

Provinces.	Number of grow- ers.	Area of growers' land ac- tually cul- tivated in tobacco.	Production.	
			1908.	Estimate for 1909.
Agusan		4.62	2,860	1,430
Albay	1	1.73	101	1,355
Ambos Camarines		14.57	10,188	10,188
Antique	26	28.88	13,966	13,706
Bataan			22	22
Batangas	25	108.73	53,004	44,347
Benguet		1.73	1,100	1,100
Bohol	381	125.11	107,118	110,310
Bulacan	11	31.32	13,517	9,117
Cagayan	10,288	14,341.17	8,974,306	8,800,000
Capiz	1,077	1,008.62	392,459	401,532
Cavite		.72	517	517
Cebu	5,425	11,858.35	6,480,531	7,785,930
Ilocos Norte	4,395	767.45	474,278	676,282
Ilocos Sur	1,466	447.22	247,504	390,861
Iloilo	1,244	1,366.65	732,689	1,117,927
Isabela	9,382	19,691.24	15,954,730	15,400,000
La Laguna		2.22	1,455	1,455
La Union	9,840	4,290.09	2,446,684	2,527,800
Lepanto-Bontoc		1.73	1,100	1,100
Leyte	375	325.97	88,640	80,054
Masbate		64.22	41,206	41,206
Mindoro		129.85	80,960	80,960
Misamis		43.23	27,830	27,830
Moro	298	577.16	28,512	29,791
Nueva Ecija	331	780.20	286,150	429,887
Nueva Vizcaya		3.36	2,200	2,200
Occidental Negros	584	1,222.97	556,261	559,478
Oriental Negros	1,250	1,065.88	620,424	648,639
Palawan				
Pampanga		4.20	2,589	2,589
Pangasinan	2,983	2,740.00	828,392	773,685
Rizal		2.47	1,661	1,661
Samar	85	152.03	57,754	55,847
Sorsogon			22	22
Surigao	160	32.93	14,566	13,669
Tarlac		213.75	137,676	137,676
Tayabas	234	160.06	47,201	77,517
Zambales		.42	268	268
Total	49,861	61,605.85	38,725,441	40,257,958

PRINCIPAL PHILIPPINE IMPORTS AND EXPORTS.

By the COLLECTOR OF CUSTOMS.

APRIL, 1910.

IMPORTS.

Articles.	Units.	Manila.	Cebu.	Iloilo.	Jolo.	Zamboanga.	Balabac.	Davao.	Totals.
Rice	Kilos--	14,170,289	9,022,935	3,782,236	177,647	250,701	4,988		
	Value--	367,109	250,153	107,140	6,470	8,174	226		
Beef cattle	Dollars--	3,189	90	61					27,408,796
	Number--	63,413	2,026	3,000					749,272
Hops	Quantity--								3,340
	Value--								68,438
Sugar	Quantity--	221,760	8,150	1,316	6,601	8,196	68		246,086
	Value--	16,296	626	89	536	539			17,113
Coffee	Dollars--	53,753	970	4,334	102	3,336	6		62,601
	Quantity--	13,637	202	929	23	779			15,572
Cacao	Dollars--	92,032	3,016	250					95,328
	Quantity--	22,759	920	128					281,294
Eggs	Dollars--	280,214	248			832			26,979
	Quantity--	26,925	11			43			23,391
Raw cotton	Dollars--	23,591							7,465
	Quantity--								
	Value--								

EXPORTS.

Articles.	Quantity--	Kilos.	2,757,570	3,444					
Hemp	Quantity--	15,475,068	281,971	3,330					18,296,977
	Value--	1,539,731		581					1,821,552
Sugar	Quantity--	10,189,055	---	9,799,983					19,989,619
	Value--	592,422		628,776					1,161,236
Copra	Quantity--	8,829,132	1,328,249	627,578	177,081				10,982,040
	Value--			57,516		16,625			1,008,865
Cigars	Quantity--	797,675	132,049						19,217
	Value--	19,217							38,816
Cigarettes	Quantity--	388,616							3,378
	Value--	3,378							3,155
All other tobacco	Quantity--	3,155							516,205
	Value--	516,205							125,045
	Quantity--	125,045							
	Value--								

THE ILOILO SUGAR MARKET.

By JOSÉ T. FIGUERAS.

APRIL.

The amount of sugar received in Iloilo from the fields and sugar mills during the month of April amounted to 282,536 piculs.

The quotation of 8 pesos and 6 reales¹ at the close of March continued until April 2, when the price dropped to 8 pesos and 5 reales. On the 5th it rose to 8 pesos and 6 reales, but dropped again the next day to 8 pesos and 5 reales. From then until the 14th no buyers were found, but on the 14th sugar was quoted at 8 pesos and 4 reales, from which it dropped on the 15th to 8 pesos and 3 reales, and on the 18th to 8 pesos and 2 reales, this price continuing steady until the close of April.

April shipments.

CROP 1909-10.

Date.	Vessel.	Destination.	Superior.	Wet.
			Piculs.	Piculs.
March 30	Iudrapura	New York	76,800	
April 3	Ecclesia	Marselles	6,800	
April 4	Strathspey	San Francisco	40,000	
April 8	Tringganu	Singapore	3,200	
April 14	Hudson	New York	32,000	
April 21	Harlow	United States	80,000	
Do	Sungkiang	Hongkong		486
Total for April			238,800	486

Exports up to April 24 for 1908 and 1909.

[In piculs.]

To—	1908-9 crop.		1909-10 crop.	
	Superior.	Wet.	Superior.	Wet.
United States	70,400		424,800	
Japan	8,000	5,915		
China	388,401		64,575	
Total	466,801	5,915	489,375	

¹ 1 real=about 12½ centavos.

TEMPERATURE AND RAINFALL FOR AGRICULTURAL DISTRICTS IN THE PHILIPPINES.

By the DIRECTOR OF THE WEATHER BUREAU.

APRIL, 1910.

[Temperature and total rainfall for twenty-four hours beginning at 6 a. m. each day.]

Date.	Hemp.				Sugar. Iloilo.	Rice. Tarlac.	Tobacco.					
	Albay.		Tacloban.				Aparri.		San Fer- nando.			
	Tempera- ture. °C.	Rainfall. mm.	Tempera- ture. °C.	Rainfall. mm.			Tempera- ture. °C.	Rainfall. mm.	Tempera- ture. °C.	Rainfall. mm.		
1	27.9	27.4	27.8	27.8			26.4	26.2	27.2			
2	27.7	1.8	27.5	5.1			27.6	26.2				
3	24.9	30.2	24.6	34.5	26.4	3.8	29.0	1.3	26.3	28.4		
4	26.3	13.2	25.5	7.3	27.0		27.0		26.4	27.9		
5	27.3	0.8	26.3	16.5	27.0	0.8	27.9		26.4	28.2		
6	27.4	4.0	26.2	2.8	27.3	0.5	28.6		26.5	27.6		
7	26.8	8.9	26.9		27.9	0.5	28.0		26.8	27.6		
8	27.4		25.8	9.0	27.4	0.3	28.4		26.8	28.2		
9	26.3	64.5	26.0	18.0	27.7		28.9		26.6	29.4		
10	27.0	0.3	27.2		27.7		28.0		27.4	29.2		
11	27.8		27.0		27.7		29.0		27.4	27.6		
12	27.8		27.3		27.3		29.8		26.6	27.4		
13	27.6	6.6	27.0	8.7	27.3		30.2		24.9	35.3		
14	26.9	7.4	26.0	29.7	27.8	0.3	29.9		26.0	28.8		
15	27.7		27.4		28.3		29.6		26.9	29.4		
16	28.0	1.8	27.2		28.0		29.5	2.0	27.0	28.5		
17	26.9		26.9	1.3	27.6		30.4		27.3	28.2		
18	26.2		28.0		27.5		30.8		27.8	28.3		
19	26.7		27.7		27.6		29.8		27.2	28.7		
20	26.4		27.3	4.3	28.0		31.0	56.4	26.6	29.4		
21	27.2		27.2	56.1	27.6	5.8	28.6		26.6	28.8		
22	27.2	17.1	24.7	40.8	25.3	6.4	28.7		26.0	2.3		
23	26.1	29.2	26.6	0.5	25.5	4.8	29.4	1.3	26.4	27.6		
24	26.2	3.3	27.5	0.8	25.5	4.7	25.4	20.8	26.5	0.5		
25	26.5	4.3	27.9	0.8	28.8		23.6	3.5	24.6	4.3		
26	28.4	10.2	27.6		28.2		28.0		25.7	6.3		
27	28.1		27.8	8.6	28.4		28.6	0.2	25.6	8.1		
28	27.9	4.0	26.6	4.6	28.2		28.9		26.5	28.0		
29	27.8	3.8	26.1	11.2	28.5	0.8	28.6		27.5	29.2		
30	27.8	2.1	26.8	0.8	28.2		28.7		27.8	29.2		

CURRENT PERIODICAL LITERATURE.

ARTICLES IN CURRENT PERIODICALS, ETC., THAT MAY BE OF INTEREST TO AGRICULTURISTS IN THE PHILIPPINES.

RUBBER.

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Manihot Rubber Trees, V. Effect of nitrate of soda upon the flow of Ceara latex (Extract from Bulletin No. 19 of the Hawaiian Experiment Station), in *Tropical Life*, March, 1910.

Cultivation and Production of Rubber in the German Colonies, by Dr. Paul Preuss, in *The Tropical Agriculturist*, February, 1910.

CACAO.

Plantaciones mixtas de Cacaoteros y Árboles de Caucho, por M. O. Labroy (in Boletin del Ministerio de Fomento de Venezuela), reprinted in *El Haciendado Mexicano*, Abril 1, 1910.

Cacao, by J. H. Hart. A continued series of articles appearing in *The West India Committee Circular*, beginning July 2, 1909.

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Efficiency of the "Hadi Process" of Sugar Manufacture, by G. Clarke and S. C. Banerjee, in *The Agricultural Journal of India*, January, 1910.

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Vanilla Culture for Tropical Queensland, by Howard Newport, in *The Queensland Agricultural Journal*, April, 1910.

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Coöperation, by E. V. Wilcox, in *The Hawaiian Forester and Agriculturist*, March, 1910.

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